

REF: UNDP – TUR –RFP – PROJ (EEB) 2014 /02

# **REQUEST FOR PROPOSALS**

for

Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm Development, Preparation of Tender File, Provision of Consultancy and Monitoring Services during RET-EAT Development

Promoting Energy Efficiency in Buildings in Turkey Project

Turkey



United Nations Development Programme April 2014

## SECTION 1. LETTER OF INVITATION

REF: UNDP - TUR - RFP - PROJ (EEB) 2014 /02

Ankara, Turkey 7 April 2014

## <u>Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm Development,</u> <u>Preparation of Tender File, Provision of Consultancy and Monitoring Services during RET-EAT</u> <u>Development</u>

Dear Mr./Ms.:

The United Nations Development Programme (UNDP) hereby invites you to submit a Proposal to this Request for Proposal (RfP) for the above-referenced subject.

This RfP includes the following documents:

Section 1 – This Letter of Invitation
Section 2 – Instructions to Proposers (including Data Sheet)
Section 3 – Technical Evaluation Grid
Section 4 – Terms of Reference
Section 5 – Proposal Submission Form
Section 6 – Documents Establishing the Eligibility and Qualifications of the Proposer
Section 7 – Technical Proposal Form
Section 8 – Financial Proposal Form
Section 9 – Contract for Professional Services, including General Terms and Conditions

Your offer, comprising of a Technical and Financial Proposal, in separate sealed envelopes, should be submitted in accordance with Section 2.

You are kindly requested to submit an acknowledgement letter to UNDP to the following address:

United Nations Development Programme Birlik Mahallesi, 415. Cadde, No: 11, 06610 Çankaya, Ankara Turkey Fax number: +90 312 496 1463 gokhan.resuloglu@undp.org Attention: Gökhan Resuloğlu

The letter should be received by UNDP no later than *11 April, 2014*. The same letter should advise whether your company intends to submit a Proposal. If that is not the case, UNDP would appreciate your indicating the reason, for our records.

If you have received this RfP through a direct invitation by UNDP, transferring this invitation to another firm requires your written notification to UNDP of such transfer and the name of the company to whom the invitation was forwarded.

Should you require further clarifications, kindly communicate with the contact person identified in the attached Data Sheet as the focal point for queries on this RfP.

UNDP looks forward to receiving your Proposal and thanks you in advance for your interest in UNDP procurement opportunities.

Yours sincerely,

Matilda Dimovska Deputy Resident Representative UNDP Turkey

# SECTION 2. INSTRUCTION TO PROPOSERS

#### Definitions

- a) "Contract" refers to the agreement that will be signed by and between the UNDP and the successful proposer, all the attached documents thereto, including the General Terms and Conditions (GTC) and the Appendices.
- b) "Country" refers to the country indicated in the Data Sheet.
- c) *"Data Sheet"* refers to such part of the Instructions to Proposers used to reflect conditions of the tendering process that are specific for the requirements of the RfP.
- d) *"Day"* refers to calendar day.
- e) "Government" refers to the Government of the country that will be receiving the services provided/rendered specified under the Contract.
- f) "Instructions to Proposers" (Section 2 of the RfP) refers to the complete set of documents that provides Proposers with all information needed and procedures to be followed in the course of preparing their Proposals
- g) "LOI" (Section 1 of the RfP) refers to the Letter of Invitation sent by UNDP to Proposers.
- h) "Material Deviation" refers to any contents or characteristics of the proposal that is significantly different from an essential aspect or requirement of the RfP, and: (i) substantially alters the scope and quality of the requirements; (ii) limits the rights of UNDP and/or the obligations of the Offeror; and (iii) adversely impacts the fairness and principles of the procurement process, such as those that compromise the competitive position of other Offerors.
- i) *"Proposal"* refers to the Proposer's response to the Request for Proposal, including the Proposal Submission Form, Technical and Financial Proposal and all other documentation attached thereto as required by the RfP.
- j) *"Proposer"* refers to any legal entity that may submit, or has submitted, a Proposal for the provision of services requested by UNDP through this RfP.
- k) "RfP" refers to the Request for Proposals consisting of instructions and references prepared by UNDP for purposes of selecting the best service provider to perform the services described in the Terms of Reference.
- I) "Services" refers to the entire scope of tasks and deliverables requested by UNDP under the RfP.
- m) "Supplemental Information to the RfP" refers to a written communication issued by UNDP to prospective Proposers containing clarifications, responses to queries received from prospective

Proposers, or changes to be made in the RfP, at any time after the release of the RfP but before the deadline for the submission of Proposals.

n) *"Terms of Reference"* (TOR) refers to the document included in this RfP as Section 4 which describes the objectives, scope of services, activities, tasks to be performed, respective responsibilities of the proposer, expected results and deliverables and other data pertinent to the performance of the range of duties and services expected of the successful proposer.

## A. GENERAL

- 1. UNDP hereby solicits Proposals in response to this Request for Proposal (RfP). Proposers must strictly adhere to all the requirements of this RfP. No changes, substitutions or other alterations to the rules and provisions stipulated in this RfP may be made or assumed unless it is instructed or approved in writing by UNDP in the form of Supplemental Information to the RfP.
- 2. Submission of a Proposal shall be deemed as an acknowledgement by the Proposer that all obligations stipulated by this RfP will be met and, unless specified otherwise, the Proposer has read, understood and agreed to all the instructions in this RfP.
- 3. Any Proposal submitted will be regarded as an offer by the Proposer and does not constitute or imply the acceptance of any Proposal by UNDP. UNDP is under no obligation to award a contract to any Proposer as a result of this RfP.
- 4. UNDP implements a policy of zero tolerance on proscribed practices, including fraud, corruption, collusion, unethical practices, and obstruction. UNDP is committed to preventing, identifying and addressing all acts of fraud and corrupt practices against UNDP as well as third parties involved in UNDP activities. (See

http://www.undp.org/about/transparencydocs/UNDP\_Anti\_Fraud\_Policy\_English\_FINAL\_june\_2011.pdf\_and

<u>http://www.undp.org/content/undp/en/home/operations/procurement/procurement\_protest/</u> for full description of the policies)

- 5. In responding to this RfP, UNDP requires all Proposers to conduct themselves in a professional, objective and impartial manner, and they must at all times hold UNDP's interests paramount. Proposers must strictly avoid conflicts with other assignments or their own interests, and act without consideration for future work. All Proposers found to have a conflict of interest shall be disqualified. Without limitation on the generality of the above, Proposers, and any of their affiliates, shall be considered to have a conflict of interest with one or more parties in this solicitation process, if they:
  - 5.1 Are or have been associated in the past, with a firm or any of its affiliates which have been engaged UNDP to provide services for the preparation of the design, specifications, Terms of Reference, cost analysis/estimation, and other documents to be used for the procurement of the goods and services in this selection process;
  - 5.2 Were involved in the preparation and/or design of the programme/project related to the services requested under this RfP; or

5.3 Are found to be in conflict for any other reason, as may be established by, or at the discretion of, UNDP.

In the event of any uncertainty in the interpretation of what is potentially a conflict of interest, proposers must disclose the condition to UNDP and seek UNDP's confirmation on whether or not such conflict exists.

- 6. Similarly, the Proposers must disclose in their proposal their knowledge of the following:
  - 6.1 That they are owners, part-owners, officers, directors, controlling shareholders, or they have key personnel who are family of UNDP staff involved in the procurement functions and/or the Government of the country or any Implementing Partner receiving services under this RfP; and
  - 6.2 All other circumstances that could potentially lead to actual or perceived conflict of interest, collusion or unfair competition practices.

Failure of such disclosure may result in the rejection of the proposal or proposals affected by the non-disclosure.

- 7. The eligibility of Proposers that are wholly or partly owned by the Government shall be subject to UNDP's further evaluation and review of various factors such as being registered as an independent entity, the extent of Government ownership/share, receipt of subsidies, mandate, access to information in relation to this RfP, and others that may lead to undue advantage against other Proposers, and the eventual rejection of the Proposal.
- 8. All Proposers must adhere to the UNDP Supplier Code of Conduct, which may be found at this link: <u>http://web.ng.undp.org/procurement/undp-supplier-code-of-conduct.pdf</u>

## **B. CONTENTS OF PROPOSAL**

#### 9. Sections of Proposal

Proposers are required to complete, sign and submit the following documents:

- 9.1 Proposal Submission Cover Letter Form (see RfP Section 5);
- 9.2 Documents Establishing the Eligibility and Qualifications of the Proposer (see RfP Section 6);
- 9.3 Technical Proposal (see prescribed form in RfP Section 7);
- 9.4 Financial Proposal (see prescribed form in RfP Section 8);
- 9.5 Any attachments and/or appendices to the Proposal.

#### **10.** Clarification of Proposal

10.1 Proposers may request clarifications of any of the RfP documents no later than the date indicated in the **Data Sheet** (DS no. 16) prior to the proposal submission date. Any request for clarification must be sent in writing via courier or through electronic means to the UNDP address indicated in the **Data Sheet** (DS no. 17). UNDP will respond in writing,

transmitted by electronic means and will transmit copies of the response (including an explanation of the query but without identifying the source of inquiry) to all Proposers who have provided confirmation of their intention to submit a Proposal.

10.2 UNDP shall endeavor to provide such responses to clarifications in an expeditious manner, but any delay in such response shall not cause an obligation on the part of UNDP to extend the submission date of the Proposals, unless UNDP deems that such an extension is justified and necessary.

#### **11. Amendment of Proposals**

- 11.1 At any time prior to the deadline of Proposal submission, UNDP may for any reason, such as in response to a clarification requested by a Proposer, modify the RfP in the form of a Supplemental Information to the RfP. All prospective Proposers will be notified in writing of all changes/amendments and additional instructions through Supplemental Information to the RfP and through the method specified in the **Data Sheet** (DS No. 18).
- 11.2 In order to afford prospective Proposers reasonable time to consider the amendments in preparing their Proposals, UNDP may, at its discretion, extend the deadline for submission of Proposals, if the nature of the amendment to the RfP justifies such an extension.

## **C. PREPARATION OF PROPOSALS**

#### 12. Cost

The Proposer shall bear any and all costs related to the preparation and/or submission of the Proposal, regardless of whether its Proposal was selected or not. UNDP shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the procurement process.

#### 13. Language

The Proposal, as well as any and all related correspondence exchanged by the Proposer and UNDP, shall be written in the language (s) specified in the **Data Sheet** (DS No 4). Any printed literature furnished by the Proposer written in a language other than the language indicated in the **Data Sheet**, must be accompanied by a translation in the preferred language indicated in the **Data Sheet**. For purposes of interpretation of the Proposal, and in the event of discrepancy or inconsistency in meaning, the version translated into the preferred language shall govern. Upon conclusion of a contract, the language of the contract shall govern the relationship between the contractor and UNDP.

#### 14. Proposal Submission Form

The Proposer shall submit the Proposal Submission Form using the form provided in Section 4 of this RfP.

#### **15. Technical Proposal Format and Content**

Unless otherwise stated in the **Data Sheet** (DS no. 28), the Proposer shall structure the Technical Proposal as follows:

- 15.1 Expertise of Firm/Organization this section should provide details regarding management structure of the organization, organizational capability/resources, and experience of organization/firm, the list of projects/contracts (both completed and ongoing, both domestic and international) which are related or similar in nature to the requirements of the RfP, and proof of financial stability and adequacy of resources to complete the services required by the RfP (see RfP clause 18 and DS No. 26 for further details). The same shall apply to any other entity participating in the RfP as a Joint Venture or Consortium.
- 15.2 Proposed Methodology, Approach and Implementation Plan this section should demonstrate the Proposer's response to the Terms of Reference by identifying the specific components proposed, how the requirements shall be addressed, as specified, point by point; providing a detailed description of the essential performance characteristics proposed; identifying the works/portions of the work that will be subcontracted; and demonstrating how the proposed methodology meets or exceeds the specifications, while ensuring appropriateness of the approach to the local conditions and the rest of the project operating environment. This methodology must be laid out in an implementation timetable that is within the duration of the contract as specified in the **Data Sheet** (DS nos. 29 and 30).

Proposers must be fully aware that the products or services that UNDP requires may be transferred, immediately or eventually, by UNDP to the Government partners, or to an entity nominated by the latter, in accordance with UNDP's policies and procedures. All proposers are therefore required to submit the following in their proposals:

- a) A statement of whether any import or export licences are required in respect of the goods to be purchased or services to be rendered, including any restrictions in the country of origin, use or dual use nature of the goods or services, including any disposition to end users; and
- b) Confirmation that the Proposer has obtained license of this nature in the past, and have an expectation of obtaining all the necessary licenses, should their Proposal be rendered the most responsive.
- 15.3 Management Structure and Key Personnel This section should include the comprehensive curriculum vitae (CVs) of key personnel that will be assigned to support the implementation of the proposed methodology, clearly defining the roles and responsibilities vis-à-vis the proposed methodology. CVs should establish competence and demonstrate qualifications in areas relevant to the TOR.

In complying with this section, the Proposer assures and confirms to UNDP that the personnel being nominated are available for the Contract on the dates proposed. If any of the key personnel later becomes unavailable, except for unavoidable reasons such as death or medical incapacity, among other possibilities, UNDP reserves the right to

consider the proposal non-responsive. Any deliberate substitution arising from unavoidable reasons, including delay in the implementation of the project of programme through no fault of the Proposer shall be made only with UNDP's acceptance of the justification for substitution, and UNDP's approval of the qualification of the replacement who shall be either of equal or superior credentials as the one being replaced.

- 15.4 Where the **Data Sheet** requires the submission of the Proposal Security, the Proposal Security shall be included along with the Technical Proposal. The Proposal Security may be forfeited by UNDP, and reject the Proposal, in the event of any or any combination of the following conditions:
  - a) If the Proposer withdraws its offer during the period of the Proposal Validity specified in the **Data Sheet** (DS no. 11), or;
  - b) If the Proposal Security amount is found to be less than what is required by UNDP as indicated in the **Data Sheet** (DS no. 9), or;
  - c) In the case the successful Proposer fails:
    - i. to sign the Contract after UNDP has awarded it;
    - ii. to comply with UNDP's variation of requirement, as per RfP clause 35; or
    - iii. to furnish Performance Security, insurances, or other documents that UNDP may require as a condition to rendering the effectivity of the contract that may be awarded to the Proposer.

#### **16. Financial Proposals**

The Financial Proposal shall be prepared using the attached standard form (Section 8). It shall list all major cost components associated with the services, and the detailed breakdown of such costs. All outputs and activities described in the Technical Proposal must be priced separately on a one-to-one correspondence. Any output and activities described in the Technical Proposal but not priced in the Financial Proposal, shall be assumed to be included in the prices of other activities or items, as well as in the final total price.

#### 17. Currencies

All prices shall be quoted in the currency indicated in the **Data Sheet** (DS no. 15). However, where Proposals are quoted in different currencies, for the purposes of comparison of all Proposals:

- a) UNDP will convert the currency quoted in the Proposal into the UNDP preferred currency, in accordance with the prevailing UN operational rate of exchange on the last day of submission of Proposals; and
- b) In the event that the proposal found to be the most responsive to the RfP requirement is quoted in another currency different from the preferred currency as per **Data Sheet** (DS no. 15), then UNDP shall reserve the right to award the contract in the currency of UNDP's preference, using the conversion method specified above.

Proposals submitted by two (2) or more Proposers shall all be rejected if they are found to have <u>any</u> of the following:

- a) they have at least one controlling partner, director or shareholder in common; or
- b) any one of them receive or have received any direct or indirect subsidy from the other/s; or
- c) they have the same legal representative for purposes of this RfP; or
- d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about, or influence on the Proposal of, another Proposer regarding this RfP process;
- e) they are subcontractors to each other's Proposal, or a subcontractor to one Proposal also submits another Proposal under its name as lead Proposer; or
- f) an expert proposed to be in the team of one Proposer participates in more than one Proposal received for this RfP process. This condition does not apply to subcontractors being included in more than one Proposal.

#### 18. Documents Establishing the Eligibility and Qualifications of the Proposer

The Proposer shall furnish documentary evidence of its status as an eligible and qualified vendor, using the forms provided under Section 5, Proposer Information Forms. In order to award a contract to a Proposer, its qualifications must be documented to UNDP's satisfaction. These include, but are not limited to, the following:

- a) That, in the case of a Proposer offering to supply goods under the Contract which the Proposer did not manufacture or otherwise produce, the Proposer has been duly authorized by the goods' manufacturer or producer to supply the goods in the country of final destination;
- b) That the Proposer has the financial, technical, and production capability necessary to perform the Contract; and
- c) That, to the best of the Proposer's knowledge, it is not included in the UN 1267/1989 List or the UN Ineligibility List, nor in any and all of UNDP's list of suspended and removed vendors.

#### **19. Joint Venture, Consortium or Association**

If the Proposer is a group of legal entities that will form or have formed a joint venture, consortium or association at the time of the submission of the Proposal, they shall confirm in their Proposal that : (i) they have designated one party to act as a lead entity, duly vested with authority to legally bind the members of the joint venture jointly and severally, and this shall be duly evidenced by a duly notarized Agreement among the legal entities, which shall be submitted along with the Proposal; and (ii) if they are awarded the contract, the contract shall be entered into, by and between UNDP and the designated lead entity, who shall be acting for and on behalf of all the member entities comprising the joint venture.

After the Proposal has been submitted to UNDP, the lead entity identified to represent the joint venture shall not be altered without the prior written consent of UNDP. Furthermore, neither the lead entity nor the member entities of the joint venture can:

- a) Submit another proposal, either in its own capacity; nor
- b) As a lead entity or a member entity for another joint venture submitting another Proposal.

The description of the organization of the joint venture/consortium/association must clearly define the expected role of each of the entity in the joint venture in delivering the requirements of the RfP, both in the Proposal and the Joint Venture Agreement. All entities that comprise the joint venture shall be subject to the eligibility and qualification assessment by UNDP.

Where a joint venture is presenting its track record and experience in a similar undertaking as those required in the RfP, it should present such information in the following manner:

- a) Those that were undertaken together by the joint venture; and
- b) Those that were undertaken by the individual entities of the joint venture expected to be involved in the performance of the services defined in the RfP.

Previous contracts completed by individual experts working privately but who are permanently or were temporarily associated with any of the member firms cannot be claimed as the experience of the joint venture or those of its members, but should only be claimed by the individual experts themselves in their presentation of their individual credentials.

If a joint venture's Proposal is determined by UNDP as the most responsive Proposal that offers the best value for money, UNDP shall award the contract to the joint venture, in the name of its designated lead entity. The lead entity shall sign the contract for and on behalf of all other member entities.

#### **20.** Alternative Proposals

Unless otherwise specified in the **Data Sheet** (DS nos. 5 and 6), alternative proposals shall not be considered. Where the conditions for its acceptance are met, or justifications are clearly established, UNDP reserves the right to award a contract based on an alternative proposal.

#### 21. Validity Period

Proposals shall remain valid for the period specified in the **Data Sheet** (DS no. 8), commencing on the submission deadline date also indicated in the **Data Sheet** (DS no. 21). A Proposal valid for a shorter period shall be immediately rejected by UNDP and rendered non-responsive.

In exceptional circumstances, prior to the expiration of the proposal validity period, UNDP may request Proposers to extend the period of validity of their Proposals. The request and the responses shall be made in writing, and shall be considered integral to the Proposal.

#### 22. Proposer's Conference

When appropriate, a proposer's conference will be conducted at the date, time and location specified in the **Data Sheet** (DS no. 7). All Proposers are encouraged to attend. Non-attendance, however, shall <u>not</u> result in disqualification of an interested Proposer. Minutes of the proposer's conference will be either posted on the UNDP website, or disseminated to the individual firms who have registered or expressed interest with the contract, whether or not they attended the conference. No verbal statement made during the conference shall modify the terms and conditions of the RfP unless such statement is specifically written in the Minutes of the Conference, or issued/posted as an amendment in the form of a Supplemental Information to the RfP.

## **D. SUBMISSION AND OPENING OF PROPOSALS**

#### 23. Submission

- 23.1 The Financial Proposal and the Technical Proposal Envelopes <u>MUST BE COMPLETELY</u> <u>SEPARATE</u> and <u>each of them must be submitted sealed individually</u> and clearly marked on the outside as either "TECHNICAL PROPOSAL" or "FINANCIAL PROPOSAL", as appropriate. Each envelope MUST clearly indicate the name of the Proposer. The outer envelopes shall bear the address of UNDP as specified in the **Data Sheet** (DS no.20) and shall include the Proposer's name and address, as well as a warning that state "not to be opened before the time and date for proposal opening" as specified in the **Data Sheet** (DS no. 24). The Proposer shall assume the responsibility for the misplacement or premature opening of Proposals due to improper sealing and labeling by the Proposer.
- 23.2 Proposers must submit their Proposals in the manner specified in the Data Sheet (DS nos. 22 and 23). When the Proposals are expected to be in transit for more than 24 hours, the Proposer must ensure that sufficient lead time has been provided in order to comply with UNDP's deadline for submission. UNDP shall indicate for its record that the official date and time of receiving the Proposal is the <u>actual</u> date and time when the said Proposal has physically arrived at the UNDP premises indicated in the Data Sheet (DS no. 20).
- 23.3 Proposers submitting Proposals by mail or by hand shall enclose the original and each copy of the Proposal, in separate sealed envelopes, duly marking each of the envelopes as "Original Proposal" and "Copy of Proposal" as appropriate. The 2 envelopes shall then be sealed in an outer envelope. The number of copies required shall be as specified in the **Data Sheet** (DS No. 19). In the event of any discrepancy between the contents of the "Original Proposal" and the "Copy of Proposal", the contents of the original shall govern. The original version of the Proposal shall be signed or initialed by the Proposer or person(s) duly authorized to commit the Proposer on every page. The authorization shall be communicated through a document evidencing such authorization issued by the highest official of the firm, or a Power of Attorney, accompanying the Proposal.
- 23.4 Proposers must be aware that the mere act of submission of a Proposal, in and of itself, implies that the Proposer accepts the General Contract Terms and Conditions of UNDP as attached hereto as Section 11.

#### 24. Deadline for Submission of Proposals and Late Proposals

Proposals must be received by UNDP at the address and no later than the date and time specified in the **Data Sheet** (DS nos. 20 and 21).

UNDP shall not consider any Proposal that arrives after the deadline for submission of Proposals. Any Proposal received by UNDP after the deadline for submission of Proposals shall be declared late, rejected, and returned unopened to the Proposer.

#### 25. Withdrawal, Substitution, and Modification of Proposals

- 25.1 Proposers are expected to have sole responsibility for taking steps to carefully examine in detail the full consistency of its Proposals to the requirements of the RfP, keeping in mind that material deficiencies in providing information requested by UNDP, or lack clarity in the description of services to be provided, may result in the rejection of the Proposal. The Proposer shall assume the responsibility regarding erroneous interpretations or conclusions made by the Proposer in the course of understanding the RfP out of the set of information furnished by UNDP.
- 25.2 A Proposer may withdraw, substitute or modify its Proposal after it has been submitted by sending a written notice in accordance with Clause 23.1, duly signed by an authorized representative, and shall include a copy of the authorization (or a Power of Attorney). The corresponding substitution or modification of the Proposal must accompany the respective written notice. All notices must be received by UNDP prior to the deadline for submission and submitted in accordance with RfP Clause 23.1 (except that withdrawal notices do not require copies). The respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or MODIFICATION".
- 25.3 Proposals requested to be withdrawn shall be returned unopened to the Proposers.
- 25.4 No Proposal may be withdrawn, substituted, or modified in the interval between the deadline for submission of Proposals and the expiration of the period of proposal validity specified by the Proposer on the Proposal Submission Form or any extension thereof.

#### 26. Proposal Opening

UNDP will open the Proposals in the presence of an ad-hoc committee formed by UNDP of at least two (2) members. If electronic submission is permitted, any specific electronic proposal opening procedures shall be as specified in the **Data Sheet** (DS no. 23).

The Proposers' names, modifications, withdrawals, the condition of the envelope labels/seals, the number of folders/files and all other such other details as UNDP may consider appropriate, will be announced at the opening. No Proposal shall be rejected at the opening stage, except for late submission, for which the Proposal shall be returned unopened to the Proposer.

#### 27. Confidentiality

Information relating to the examination, evaluation, and comparison of Proposals, and the recommendation of contract award, shall not be disclosed to Proposers or any other persons not officially concerned with such process, even after publication of the contract award.

Any effort by a Proposer to influence UNDP in the examination, evaluation and comparison of the Proposals or contract award decisions may, at UNDP's decision, result in the rejection of its Proposal.

In the event that a Proposer is unsuccessful, the Proposer may seek a meeting with UNDP for a debriefing. The purpose of the debriefing is discussing the strengths and weaknesses of the Proposer's submission, in order to assist the Proposer in improving the proposals presented to UNDP. The content of other proposals and how they compare to the Proposer's submission shall not be discussed.

## **E. EVALUATION OF PROPOSALS**

#### 28. Preliminary Examination of Proposals

UNDP shall examine the Proposals to determine whether they are complete with respect to minimum documentary requirements, whether the documents have been properly signed, whether or not the Proposer is in the UN Security Council 1267/1989 Committee's list of terrorists and terrorist financiers, and in UNDP's list of suspended and removed vendors, and whether the Proposals are generally in order, among other indicators that may be used at this stage. UNDP may reject any Proposal at this stage.

#### **29.** Evaluation of Proposals

- 29.1 UNDP shall examine the Proposal to confirm that all terms and conditions under the UNDP General Terms and Conditions and Special Conditions have been accepted by the Proposer without any deviation or reservation.
- 29.2 The evaluation team shall review and evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference and other documentation provided, applying the evaluation criteria, sub-criteria, and point system specified in the **Data Sheet** (DS no. 32). Each responsive Proposal will be given a technical score. A Proposal shall be rendered non-responsive at this stage if it does not substantially respond to the RfP particularly the demands of the Terms of Reference, which also means that it fails to achieve the minimum technical score indicated in the **Data Sheet** (DS no. 25). Absolutely no changes may be made by UNDP in the criteria, sub-criteria and point system indicated in the **Data Sheet** (DS no. 32) after all Proposals have been received.
- 29.3 In the second stage, only the Financial Proposals of those Proposers who achieve the minimum technical score will be opened for evaluation for comparison and review. The Financial Proposal Envelopes corresponding to Proposals that did not meet the minimum passing technical score shall be returned to the Proposer unopened. The overall evaluation score will be based either on a combination of the technical score and the financial offer, or the lowest evaluated financial proposal of the technically qualified Proposers. The evaluation method that applies for this RfP shall be as indicated in the **Data Sheet** (DS No. 25).

When the Data Sheet specifies a combined scoring method, the formula for the rating of the Proposals will be as follows:

Rating the Technical Proposal (TP):			
<b>TP Rating</b> = (Total Score Obtained by the Offer / Max. Obtainable Score for TP) x 100			
Rating the Financial Proposal (FP):			
<b>FP Rating</b> = (Lowest Priced Offer / Price of the Offer Being Reviewed) x 100			
Total Combined Score:			
(TP Rating) x (Weight of TP, e.g. 70%)			
+ (FP Rating) x (Weight of FP, e.g., 30%)			
Total Combined and Final Rating of the Proposal			

- 29.4 UNDP reserves the right to undertake a post-qualification exercise aimed at determining, to its satisfaction the validity of the information provided by the Proposer. Such post-qualification shall be fully documented and, among those that may be listed in the **Data Sheet** (DS No.33), may include, but need not be limited to, all or any combination of the following :
  - Verification of accuracy, correctness and authenticity of information provided by the Proposer on the legal, technical and financial documents submitted;
  - Validation of extent of compliance to the RfP requirements and evaluation criteria based on what has so far been found by the evaluation team;
  - Inquiry and reference checking with Government entities with jurisdiction on the Proposer, or any other entity that may have done business with the Proposer;
  - Inquiry and reference checking with other previous clients on the quality of performance on ongoing or previous contracts completed;
  - Physical inspection of the Proposer's offices, branches or other places where business transpires, with or without notice to the Proposer;
  - Quality assessment of ongoing and completed outputs, works and activities similar to the requirements of UNDP, where available; and
  - Other means that UNDP may deem appropriate, at any stage within the selection process, prior to awarding the contract.

#### **30.** Clarification of Proposals

To assist in the examination, evaluation and comparison of Proposals, UNDP may, at its discretion, ask any Proposer for a clarification of its Proposal.

UNDP's request for clarification and the response shall be in writing. Notwithstanding the written communication, no change in the prices or substance of the Proposal shall be sought, offered, or permitted, except to provide clarification, and confirm the correction of any

arithmetic errors discovered by UNDP in the evaluation of the Proposals, in accordance with RfP Clause 32.

Any unsolicited clarification submitted by a Proposer in respect to its Proposal, which is not a response to a request by UNDP, shall not be considered during the review and evaluation of the Proposals.

#### **31.** Responsiveness of Proposal

UNDP's determination of a Proposal's responsiveness will be based on the contents of the Proposal itself.

A substantially responsive Proposal is one that conforms to all the terms, conditions, TOR and other requirements of the RfP without material deviation, reservation, or omission.

If a Proposal is not substantially responsive, it shall be rejected by UNDP and may not subsequently be made responsive by the Proposer by correction of the material deviation, reservation, or omission.

#### **32.** Nonconformities, Reparable Errors and Omissions

Provided that a Proposal is substantially responsive, UNDP may waive any non-conformities or omissions in the Proposal that, in the opinion of UNDP, do not constitute a material deviation.

Provided that a Proposal is substantially responsive, UNDP may request the Proposer to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Proposal related to documentation requirements. Such omission shall not be related to any aspect of the price of the Proposal. Failure of the Proposer to comply with the request may result in the rejection of its Proposal.

Provided that the Proposal is substantially responsive, UNDP shall correct arithmetical errors as follows:

- a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of UNDP there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
- b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to the above.

If the Proposer does not accept the correction of errors made by UNDP, its Proposal shall be rejected.

## F. AWARD OF CONTRACT

#### 33. Right to Accept, Reject, or Render Non-Responsive Any or All Proposals

UNDP reserves the right to accept or reject any Proposal, to render any or all of the Proposals as non-responsive, and to reject all Proposals at any time prior to award of contract, without incurring any liability, or obligation to inform the affected Proposer(s) of the grounds for UNDP's action. Furthermore, UNDP shall not be obliged to award the contract to the lowest price offer.

UNDP shall also verify, and immediately reject their respective Proposal, if the Proposers are found to appear in the UN's Consolidated List of Individuals and Entities with Association to Terrorist Organizations, in the List of Vendors Suspended or Removed from the UN Secretariat Procurement Division Vendor Roster, the UN Ineligibility List, and other such lists that as may be established or recognized by UNDP policy on Vendor Sanctions. (See

<u>http://www.undp.org/content/undp/en/home/operations/procurement/procurement\_protest/</u> for details)

#### 34. Award Criteria

Prior to expiration of the period of proposal validity, UNDP shall award the contract to the qualified Proposer with the highest total score based on the evaluation method indicated in the **Data Sheet** (DS nos. 25 and 32).

#### 35. Right to Vary Requirements at the Time of Award

At the time of award of Contract, UNDP reserves the right to vary the quantity of services and/or goods, by up to a maximum twenty five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.

#### 36. Contract Signature

Within fifteen (15) days from the date of receipt of the Contract, the successful Proposer shall sign and date the Contract and return it to UNDP.

Failure of the successful Proposer to comply with the requirement of RfP Clause 35 and this provision shall constitute sufficient grounds for the annulment of the award, and forfeiture of the Proposal Security if any, and on which event, UNDP may award the Contract to the Proposer with the second highest rated Proposal, or call for new Proposals.

#### **37.** Performance Security

A performance security, if required, shall be provided in the amount and form provided in Section 9 and by the deadline indicated in the **Data Sheet** (DS no. 14), as applicable. Where a Performance Security will be required, the submission of the said document, and the confirmation of its acceptance by UNDP, shall be a condition for the effectivity of the Contract that will be signed by and between the successful Proposer and UNDP.

#### 38. Bank Guarantee for Advanced Payment

Except when the interests of UNDP so require, it is the UNDP's preference to make no advanced payment(s) on contracts (i.e., payments without having received any outputs). In the event that the Proposer requires an advanced payment upon contract signature, and if such request is duly accepted by UNDP, and the said advanced payment exceeds 20% of the total proposal price, or exceed the amount of USD 30,000, UNDP shall require the Proposer to submit a Bank Guarantee in the same amount as the advanced payment. A bank guarantee for advanced payment shall be furnished in the form provided in Section 10.

#### **39. Vendor Protest**

UNDP's vendor protest procedure provides an opportunity for appeal to those persons or firms not awarded a purchase order or contract through a competitive procurement process. In the event that a Proposer believes that it was not treated fairly, the following link provides further details regarding UNDP vendor protest procedures: http://www.undp.org/procurement/protest.shtml

## **Instructions to Proposers**

## DATA SHEET

The following data for the services to be procured shall complement, supplement, or amend the provisions in the Instructions to Proposers. In the case of a conflict between the Instructions to Proposers, the Data Sheet, and other annexes or references attached to the Data Sheet, the provisions in the Data Sheet shall govern.

DS No.	Cross Ref. to Instruc -tions	Data	Specific Instructions / Requirements	
1		Project Title:	Promoting Energy Efficiency in Buildings in Turkey	
2		Title of Services/Work:	Algorithm Development of the Renewable Energy Technologies-Economic Analysis Tool (RET-EAT), preparation of tendering documents for the RET-EAT software development works and provision of consultancy and monitoring services during RET-EAT software development works REF: UNDP – TUR – RFP – PROJ (EEB) 2014 /02	
3		Country / Region of Work Location:	Ankara / Turkey	
4	C.13	Language of the Proposal:	English	
5	C.20	Conditions for Submitting Proposals for Parts or sub-parts of the TOR	Not allowed	
6	C.20	Conditions for Submitting Alternative Proposals	Shall not be considered	
7	C.22	A pre-proposal conference will be held on:	<u>N/A</u>	
8	C.21	Period of Proposal Validity commencing on the submission date	120 days	

9	B.9.5 C.15.4 b)	Proposal Security	Not Required	
10	B.9.5	Acceptable forms of Proposal Security	N/A	
11	B.9.5 C.15.4 a)	Validity of Proposal Security	N/A	
12		Advanced Payment upon signing of contract	Not allowed	
13		Liquidated Damages	For services which are not provided by the Contractor in full compliance with the ToR in terms of quality, timeliness, price, etc. and which therefore are not accepted by UNDP; UNDP reserves the right to proceed with any one or all of the below actions: 1-Procure the subject services from another party at a price comparable to market rates; 2-Request and receive payment of the service price billed by the other party, from the Contractor. 3- Impose a penalty of up to 10% of the total price of the subject service, stated in the contract.	
14	F.37	Performance Security	Not Required	
15	C.17, C.17 b)	Preferred Currency of Proposal and Method for Currency conversion	United States Dollars (US\$)	
16	B.10.1	Deadline for submitting requests for clarifications/ questions	7 days before the submission date.	
17	B.10.1	Contact Details for submitting clarifications/questions <sup>1</sup>	Focal Person in UNDP: Gökhan Resuloğlu, Finance and Administrative Officer of GEF EE Projects Address: United Nations Development Programme Birlik Mahallesi, 415. Cadde, No: 11, 06610 Çankaya, Ankara - Turkey Fax No. : +90 312 496 1463	

<sup>&</sup>lt;sup>1</sup> This contact person and address is officially designated by UNDP. If inquiries are sent to other person/s or address/es, even if they are UNDP staff, UNDP shall have no obligation to respond nor can UNDP confirm that the query was officially received.

26	C.15.1	Required Documents that must be Submitted to Establish	Company Profile, which should <u>not</u> exceed ten (10) pages, including printed brochures	
25	E.29.2 E.29.3 F.34	Evaluation method to be used in selecting the most responsive Proposal	Combined Scoring Method, using the 70%-30% distribution for technical and financial proposals, respectively, where the minimum passing score of technical proposal is 70%.	
24	D.23.1	Date, time and venue for opening of Proposals	Date : May 2014 Venue : UN House, Ankara-Turkey	
23	D.23.2 D.26	Conditions and Procedures for electronic submission and opening, if allowed	Electronic submission of proposals is not allowed.	
22	D.23.2	Allowable Manner of Submitting Proposals	Courier/Hand Delivery	
21	C.21 D.24	Deadline of Submission	Date : 5 May 2014 Time : 17:30 (COB)	
			Birlik Mah. 2. Cadde No: 11, 06610, Çankaya Ankara-Turkey <u>Please clearly indicate the REF: UNDP – TUR –RFP – PROJ</u> <u>(EEB) 2014 /02 on the envelope.</u>	
20	D.23.1 D.23.2 D.24	Proposal Submission Address	Attention: Gökhan Resuloğlu, Finance and Administrative Officer of GEF EE Projects United Nations Development Programme (UNDP) Turkey	
19	D.23.3	No. of copies of Proposal that must be submitted	Original : 1 Copies: 2	
18	B.11.1	Manner of Disseminating Supplemental Information to the RfP and responses/clarifications to queries	Direct communication to prospective Proposers by e-mail of fax, and Posting on the website 1-www.tr.undp.org 2-www.un.org.tr 3-www.devbusiness.com 4-www.ungm.org 5-www.undp.org	
			E-mail address dedicated for this purpose: gokhan.resuloglu@undp.org	

<sup>&</sup>lt;sup>2</sup> If the proposer is a joint venture or consortium, the leading partner is obliged to comply with the requirements.

		only for the applicable items.)	<ul> <li>Proposer is not a corporation</li> <li>Trade name registration papers, if applicable</li> <li>Official Letter of Appointment as local representative, if Proposer is submitting a Proposal on behalf of an entity located outside the country</li> <li>Quality Certificate (e.g., ISO, etc.) and/or other similar certificates, accreditations, awards and citations received by the Proposer, if any</li> <li>2013 Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report, if applicable or 2013 financial statement (Income Statement and Balance Sheet) certified by a public accountant</li> <li>Statement of Satisfactory Performance from the Top 5 Clients in terms of Contract Value the past 2 years</li> <li>All information regarding any past and current litigation during the last two (2) years, in which the Proposer is involved, indicating the parties concerned, the subject of the litigation, the amounts involved, and the final resolution if already concluded.</li> </ul>	
27		Other documents that must be Submitted to Establish Eligibility	<ul> <li>Not be in the circumstances of disqualification or restriction set forth in the Laws No. 4734 and 4735 (or as per the relevant laws of the country in which we operate) and not be in the circumstances of those that cannot participate in the procurement as per the same Law (or as per the relevant laws of the country in which we operate).</li> <li>Not be associated, or have not been associated in the past, directly or indirectly, with entities or any of their affiliates, which have been engaged by the Employer to provide consulting services for the preparation of the design specifications, other documents and/or the present RFP.</li> <li>Have been legally established before 2014,</li> <li>Declaration of Quick Ratio of the Offeror based on 2013 financial statements certified by a public accountant</li> </ul>	
28	C.15	Structure of the Technical Proposal	Please refer to Section 7.	
29	C.15.2	Latest Expected date for commencement of Contract	2 June 2014	

30	C.15.2	Expected duration of contract (Target Commencement Date and Completion Date)	24 Months between 2 June 2014-1 June 2016 (11 months for STAGE I; 13 months for STAGE II)	
31		UNDP will award the contract to:	One Proposer only	
32	E.29.2 F.34	Criteria for the Award of Contract and Evaluation of Proposals	<ul> <li>The overall evaluation score will be based on a combinatio of the technical score and the financial offer. The eligible Offeror who secured the highest cumulative score will be considered for the award of contract.</li> <li>The weight of the Technical Evaluation is 70% and the weight of the Financial Evaluation is 30%. Please refer to Section 3-Technical Evaluation Grid.</li> <li>The "Grand Total" amount to be quoted by the Offerors shall be the basis of Financial Evaluation.</li> </ul>	
33	E.29.4	Post-Qualification Actions	N/A	
34		Conditions for Determining Contract Effectivity	Upon the signature of the contract by both parties.	
35		Payment	UNDP shall effect 100% of payment for each deliverable to the Contractor upon acceptance and approval by UNDP, of the respective deliverable and related invoices submitted by the contractor. Invoices shall be paid within 30 (thirty) days of the date of their acceptance by UNDP.	
36		Taxation	UN and its subsidiary organs are exempt from all taxes. Therefore Offerors shall prepare their Financial Proposals, excluding VAT. It is the Offeror's responsibility to learn from relevant authorities (Ministry of Finance) and/or to review/confirm published procedures and to consult with a certified financial consultant as needed, to confirm the scope and procedures of VAT exemption application as per VAT Law and Ministry of Finance's Communiqués.	
37		Other Information Related to the RfP	NA	

# SECTION 3. TECHNICAL EVALUATION GRID

Summa	ry of Technical Proposal Evaluation Forms	Score Weight	Points Obtainable
1.	Expertise of Firm / Organization	20%	200
2.	Proposed Methodology, Approach and Implementation Plan	40%	400
3. Management Structure and Key Personnel		40%	400
TOTAL			1000

Technical Proposal Evaluation			Points
Form 1			obtainable
	Expertise of the Firm/Organization		
1.1	General Organizational Capacity		100
	1.1.1 General Experience (25 pts)		
	1.1.2 Specialization (50 pts)		
	1.1.3 Financial Strength (25 pts)		
1.2	Relevance		100
	1.2.1 Experience on Similar Programme/Projects (60 pts)		
	1.2.2 Experience on Projects in the Region/Country (Turkey) (40 pts)		
		TOTAL PART 1	200

Techr	nical P	roposal Evaluation	Points
Form	2		Obtainable
Proposed Methodology, Approach and Implementation Plan			
2.1		Proposed Methodology and Approach	200
	2.1.1	Level of compliance of the Offeror's description of the scope of the work and	50
		comments on the Terms of Reference, compared to the ToR,)	
	2.1.2	The strength and applicability of the technical methodology and approach, proposed	100
		by the Offeror	
	2.1.3	Quality assurance and risks, identified by the Offeror, along with proposed risk	50
		mitigation strategies and measures	
2.2		Implementation Plan	200
	2.2.1	Work flow is clear (step-by-step) and is in line with the ToR	50
	2.2.2	Milestones clearly identified, as per the Terms of Reference	60
	2.2.3	Time plan is realistic and achievable, and is in line with the ToR	60
	2.2.4	Work flow and time plan is supported by a clear resource schedule (personnel time +	30
		equipment (e.g. hardware and software) + data)	
		TOTAL PART 2	400

Technical Proposal Evaluation Form 3			Points Obtainable
	Management Structure and Key Personnel		
3.1	Proposed Team Structure		60
3.2	Key Personnel <sup>3</sup>		
3.2.1	Energy Efficiency and Renewable Energy Expert (Team Leader), as defined in the Terms of Reference		90
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	(15)	
	- Professional Experience	(25)	
	- Specific Experience	(50)	
322	Renewable Energy Expert as defined in the Terms of Reference		90
5.2.2			
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	(15)	
	- Professional Experience	(25)	
	- Specific Experience	(50)	
3.2.3	Financial Expert, as defined in the Terms of Reference		70
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	(10)	
	- Professional Experience	(20)	
	- Specific Experience	(40)	
3.2.4	IT Expert, as defined in the Terms of Reference		90
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	(15)	
	- Professional Experience	(25)	
	- Specific Experience	(50)	
		TOTAL PART 3	400

<sup>&</sup>lt;sup>3</sup> In the event that qualifications of a key personnel to be proposed by the Offerors do not meet one of the relevant minimum requirements, he/she shall secure zero (0) points from the evaluation.

In the event that qualifications of **two or more key personnel** to be proposed by the Offerors do not meet one of the relevant minimum requirements the Offerors may be disqualified.

UNDP possess the right to ask the Contractor to replace the personnel that do not meet the minimum requirements before contract signature. Signature of the contract will be bound by provision of an expert who fully meets the minimum requirements stated in the ToR. In such case, the contract price to be proposed by the Contractor will remain unchanged.

# SECTION 4. TERMS OF REFERENCE (TOR)

## A. PROJECT TITLE: PROMOTING ENERGY EFFICIENCY IN BUILDINGS IN TURKEY

## **B. PROJECT DESCRIPTION**

#### **B.1. Background**

Between 1990 and 2011, primary energy consumption in Turkey has increased more than double. Turkey's primary energy consumption in 2011 was 114.8 Mtoe, compared to 52.6 Mtoe level in 1990. The rise of income and rapid urbanization has been stimulating the primary energy demand. Recent studies<sup>4&5</sup> estimate that the primary energy demand will increase at an average of 3.5 % annually for the next decade. Turkey's annual electricity demand has tripled since 1990, reaching 229 TWh in 2011. Electricity use in the residential and commercial sector accounts for 25 % of final energy consumption. The largest share of the building sector's energy consumption (75% of the total energy mix) belongs to heating, cooling, and domestic hot water needs.

Regarding final energy consumption, the building sector represents the 2<sup>nd</sup> largest energy consumer, accounting for 34.5 % of the total final energy consumption in 2011 (equal to 29.9 Mtoe). The amount of energy produced through renewable energy resources is considerably low compared with the overall energy consumption in buildings. The share of renewable energy within the building sector's final energy consumption is around 5%. This amount is almost entirely met from either geothermal resources or solar flat-plate collectors. Furthermore, the energy produced from renewable energy resources (other than geothermal-solar thermal) or energy utilized in a more rational and efficient way (such as through cogeneration or trigeneration) is unknown but estimated to be insignificant compared with the final energy demand.

The energy consumption in building sector leads to significant  $CO_2$  emissions, mostly associated with combustion of fossil fuels. According to the 2010 GHG National Inventory data, the building sector's emissions (calculated according to energy consumption) totaled 38 million tonnes  $CO_2$  or 34% of the total national energy-related  $CO_2$  emissions (112 million tonnes). Therefore, the building sector represents significant opportunities for cost-effective energy savings and  $CO_2$  emissions reduction potential, estimated to be around 35-45 %<sup>6</sup> of the current levels.

Turkey has gone a long way in establishing a regulatory basis that favors investments in energy efficient buildings. Current policies and strategies support the use of energy (including electricity) produced from renewable energy resources (such as wind, hydro, geothermal, solar or biomass) and favor more efficient and rational ways and means of utilizing energy resources (such as through cogeneration/trigeneration) through on site or off site applications. Yet there are still a number of critical barriers hampering further development of the market.

In order to overcome some of the barriers to energy efficient buildings, and to promote the use of renewable energy or energy efficient systems in buildings and thereby to reduce the final external energy consumption and associated GHG emissions in buildings sector in Turkey, a "Renewable Energy Technologies Economic Analysis Tool" for buildings is planned to be prepared and made available to the

<sup>&</sup>lt;sup>4</sup> ABB (2011): Trends in Global Energy Efficiency – Country Report Turkey

<sup>&</sup>lt;sup>5</sup> 2012 Energy Report, Turkish National Committee of the World Energy Council

<sup>&</sup>lt;sup>6</sup> Based on estimations by MoENR

building and energy sector. This tool is expected to promote and enhance the utilization of renewable energy resources and energy efficient systems in the buildings, since it will demonstrate the feasibility and economic, environmental and other benefits in a more quantitative and comparable manner.

#### **B.2** Definitions

The following terms, symbols, concepts, acronyms and abbreviations are frequently used in this Terms of Reference:

**UNDP:** United Nations Development Programme ES: Economic Savings Employer: UNDP EU: European Union **EXE:** Exergy Efficiency **Contractor**: The entity, contracted by UNDP, to perform the services, stipulated in these Terms of **IEEE:** Institute of Electrical and Electronics Engineers Reference **IN:** Specific Increase in Initial Investment The Assignment: Unless otherwise specifically noted, **GEF:** Global Environment Facility "the Assignment" refers to the "Development of the **GDRE:** General Directorate for Renewable Energy RET Tool Algorithm and the preparation of the GHG: Greenhouse Gas tendering documents for the RET tool" MOENR: Ministry of Energy and Natural Resources Terms of Reference (ToR): Annex 3 of the Request for MoEU: Ministry of Environment and Urbanism Proposal (This document) which articulates terms and PMU: Project Management Unit staffed by UNDP and conditions for the assignment. other project partner agencies **ABS:** Absorption Cooling System PV: Photo-voltaic system ADS: Adsorption Cooling System **PVT:** Photo-voltaic and Thermal ASHRAE: American Society of Heating, Refrigerating, **REMM:** Rational Exergy Management Model and Air-Conditioning Engineers, Inc. **<u>RET-EAT:</u>** Renewable Energy Technologies Economic BEP: Building Energy Performance Analysis Tool CHP: Combined Heat and Power System SI: International system of units **COR:** CO<sub>2</sub> Emission Reduction Ratio SE: Solar Energy DHW: Domestic Hot Water SES: Sustainable Energy System MGM: General Directorate for Meteorology SRS: Software Requirement Specifications **<u>EE:</u>** Energy Efficiency RE: Renewable Energy EIA: Environmental Impact Assessment TES: Thermal Energy Storage **EKB:** Building Energy Performance Certificate **TG:** Tri-generation system EN: European Norm TS: Turkish Standards ENS: Energy Savings Y: Simple Payback Period **EPDK:** Energy Market Regulatory Authority WE: Wind Energy

ERD: Entity Relationship Diagram

## C. OBJECTIVE OF THE ASSIGNMENT AND EXPECTED RESULTS

In order to promote the use of renewable energy resources in buildings and thereby to reduce the final external energy consumption and associated GHG emissions in the buildings sector of Turkey, a "Renewable Energy Technologies Economic Analysis Tool" will be developed within the Promoting Energy Efficiency in Buildings Project.

This tool will be developed in parallel with the Article 22 of the Building Energy Performance Regulation, (*dated 05.12.2008 and numbered 27075 Official Gazette*) and will cover all the energy sources and technologies covered in this article, to say the least.

Ministry of Energy and Natural Resources (MoENR), General Directorate of Renewable Energy (YEGM) and Ministry of Environment and Urbanism (MoEU) will collaborate to start and sustain a RET Economic Analysis Tool with the below functionalities.

- Calculation of benefits from RET for buildings, based on hourly energy models and environmental data,
- Calculation of related costs and benefits,
- Comparison of possible RET implementation scenarios and base building scenarios.

The RET-EAT will serve as the guidance and calculation tool for the building design sector, promoting better energy performance, higher energy efficiency, and increased level of onsite renewable energy applications in buildings sector.

Within this framework, the overall scope of work regarding the development of this "RET Economic Analysis Tool" (RET-EAT) is split into two stages:

- STAGE I: DEVELOPMENT OF THE ALGORITHM AND RELEVANT REQUIRED ANNEXES FOR THE RET-EAT SOFTWARE DEVELOPMENT TENDER,
- **STAGE II:** DEVELOPMENT OF THE SOFTWARE OF THE RET-EAT.
- <u>For Stage I</u>, the Contractor will *deliver complete tendering documents, including the detailed algorithm definitions and all additional required technical specifications and definitions, for the tender works of RET-EAT software development tender;*
- <u>For Stage II</u>, the Contractor will *provide bid evaluation services to UNDP for selecting a Contractor who will develop RET-EAT software; and provide consultancy and monitoring services during the development of RET-EAT software.* The Software Development Contractor will be responsible for software development works and will be identified through another tender process.

## C.1 Brief description of Stage I:

A detailed algorithm for the RET-EAT will be developed. The purpose of this algorithm is the calculation of utilization of renewable and waste energy and sustainability performance for:

- The stand-alone (such as PV panels) or hybrid (such as PVT, solar-wind combined systems) renewable energy systems, equipment, or devices,
- The energy efficient and environmentally conscious system solutions such as combined heat and power (CHP)/Tri-generation (TG), heat pumps (HP), thermal energy storage (TES), cooling with heat (ABS or ADS),
- The integrated utilization of the above mentioned systems at their different load share ratios and different clustering alternatives (as detailed in Section D of ToR),
- The calculation of the costs and benefits related to the possible solutions in 10 year time frame perspective, with respect to the fuel and energy supply price estimation methodologies to be developed.

In addition, the algorithm to be developed shall comprise such a structure that it will be able to carry out calculations, evaluations, and reporting-archiving activities about the ratio of such investments regarding renewable energy utilization in buildings to the total building costs (which must be based on the current MoEU unit costs). While such projects increase in the future, this algorithmic structure will pave way to establish and maintain essential data banks that may be used for updating rules and regulations about building evaluation metrics. Furthermore, this algorithmic structure will contribute to the establishment of a nationwide efficient building benchmarking system.

In order to guide decision makers and energy strategists, the reporting activity shall include the overall and broken-down impacts (positive or negative) of each possible system that may be used in a given building regarding building efficiency and pay-back periods in terms of the investment costs of such possible systems. Furthermore, CO<sub>2</sub> emissions and exergy efficiency calculations, related analysis reports will be provided on user's request. The broken-down reporting schedule shall also reveal the partial contribution of each renewable energy resource and system to the overall building energy performance.

The algorithm shall also be capable of carrying out analysis and comparisons regarding different types and combinations of systems and equipment that the user may consider to set up in the building based on renewable/sustainable/waste energy resources in terms of economic, environmental, and technical basis with respect to different load sharing figures in that building.

Furthermore, a tender document will be developed containing the complete set of technical specification (including Software Resource Specifications (SRS)). The complete set of technical specification for the RET-EAT shall contain:

- Software Requirement Specifications for the RET-EAT, specifying the software scope and requirements,
- Data specifications, flowcharts and pseudo codes for the calculation algorithms of the RET-EAT,
- Specification of the software architecture, database design and required network infrastructure.

#### C.I.I Brief description of algorithm development activities for the RET-EAT

The algorithmic structure shown in Figure 4.1 consists of three main modular layers:

**MODULE A-DATA MANAGEMENT MODULE:** This modular layer contains all hourly-based building system loads, either from actual data recorded from an existing building or from a suitable building simulation package. This module shall contain fixed (one-time calculated) hourly building loads data, which will be used in two separate methods, namely Method 1 (Fast-Track Algorithm), Method 2 (Detailed Analysis Algorithm). All data must cover 365 days of a year and 24 for hours of each day. This module shall contain all relevant information regarding performance analysis, economic evaluation, reporting, energy and fuel price predictions, equipment prices and their predictions for the future, and the basis for benchmarking. Furthermore, it will contain all cooling degree-hour and all heating degree-hour values of Turkish cities and towns published by MGM. Regarding predictions in the fuel and energy prices, the database shall cover for at least the next ten years starting from the calendar year of the program that enters into service first. Regarding such predictions in the database shall be updated by the system in every three months. Regarding equipment prices and performance characteristics, the algorithm shall enable the system administrator to update every six months.

For the robust establishment of all these purposes this module shall enable to collect all related information, accept inputted information in prescribed formats, process these information and enable to generate information, store these information in suitable data structures (See Annex II) that makes it possible to update information and make predictions in suitable media, interfaces, and interactive means. Furthermore, this module shall be an integration of all these information and dynamic data banks, which are capable of establishing all links and coordination among the information and generating default values and updating them.

**MODULE B-SYSTEM ANALYSIS MODULE:** This modular layer shall basically establish the hourly operating simulation and raw analysis data. This module is at the center of the entire algorithm. This layer receives fixed hourly building loads data from module A. This data shall be used in two different methods. These methods are:

**Method 1:** This method shall provide a faster calculation and analysis algorithm structure with less amount of input regarding building loads and may be equally used at the earlier stages of design like concept design phase of the building for design optimization purposes. This method shall predict the hourly sensible heating and cooling loads of the building based on the average overall U value of the building to be separately made available for heating and cooling seasons and the hourly sensible and sensible cooling degree-hours issued by the General Directorate for Meteorology (MGM). Latent cooling loads shall be approximated again on an hourly basis as a fraction of hourly sensible cooling loads according to a factoring table to be prepared by the Contractor, which shall take into account at least the climatic conditions of the meteorological point, building type, building function, building size and infiltration, exfiltration characteristics. Service hot water may be also calculated in a similar format. Electrical loads may be based on annual values but may also be broken down into hourly values according to a load profile prediction algorithm to be prepared or to be adopted by the Contractor.

**Method 2:** This is a more accurate and realistic method which uses hourly building loads data imported from the execution of an energy modeling software outside of this algorithm for one time only. Such fixed data provides all hourly building loads and whether it comes from BEP-TR, Energy Plus or others, the algorithmic structure of this method shall be such that the method may be used equally well at the

design phase of the building for a building that has a completed Project, or even at the certification process like Building Energy Performance Certificate (EKB). Although the hourly data shall remain fixed in the data base the designer or the person carrying out the economic analysis may wish to try several renewable energy/sustainable system options by only varying their load sharing portions and the number and type of them without changing the fixed hourly building loads data, because such changes do not affect the building loads in general.

In addition, this modular layer shall prepare the building input data for the building under construction in a vectoral hierarchical manner once the user input is interactively received by the user-computer interface (See Annex II). This modular layer shall also include a separate algorithm for fast-track analysis using the cooling degree-hour and heating degree-hour values published for the given city or town in Turkey. This fast-track algorithm shall in the future also generate sufficient data for making a comparative analysis to see the differences between the main analysis algorithm and this one and to make necessary adjustments if necessary to the fast-track algorithm.

**MODULE C-EVALUATION AND REPORTING MODULE**: All calculations and analyses regarding the system evaluation based on defined metrics with respect to economic, environmental, and efficiency will be carried out and reported in this modular layer. Furthermore, algorithms are to be developed for generating, maintaining, and sustaining data banks regarding information about feedbacks (user or internal) and benchmarking in this module. In addition, in order to enable a more accurate and updated prediction about fuel and energy price, at least three prediction models will be developed. This modular layer shall include ten-year (10-year) prediction algorithm for energy and fuel prices based on these models. This modular layer shall also include all necessary algorithms to store and to archive all evaluations in electronic/printed/internet media. Finally, this layer shall include interactive user interfaces at different pre-set authorization/security levels.

In its general structuring, this module, which can also be defined as a "Decision Support Mechanism", is expected to have the following features:

- **Module C-I. SYSTEM ENERGY SAVINGS:** This module shall calculate the energy efficiency and if selected by the user, the exergy efficiency on an hourly operating basis. Based on the current building simulation data, hourly building electrical energy loads related to comfort cooling (if operated by electrical power) and comfort cooling loads and comfort heating loads shall change each year. A study shows that comfort cooling loads shall be increased uniformly for each consecutive year by 3% and comfort heating loads shall be decreased uniformly for each consecutive year by 2% (due to combined effect of global warming and building aging)<sup>7</sup>. Similarly, the percentage ratios regarding the change in cooling loads and heating loads will be researched by the Contractor and will be proposed to the Employer to be used in the algorithms. For fast-track analysis cooling degree-hour and heating degree-hour values will be used.
- **Module C-II. ENVIRONMENTAL CONSCIOUSNESS**: CO<sub>2</sub> emissions reduction potentials shall be calculated based on the energy efficiency and exergy efficiency (if opted by the user)

<sup>&</sup>lt;sup>7</sup> <u>http://www.pnl.gov/main/publications/external/technical\_reports/PNNL-17826.pdf</u>

- **Module C-III. ECONOMY:** The initial investment burden due to the use of renewable energy systems and utilization of renewable energy resources in terms of a percent value of the total building cost (which must be based on the current MoEU unit costs) and the pay-back period in the ten-year perspective shall be calculated by noting the operating costs and financial revenues of these systems in an overall format and broken-down format for each renewable system and energy resource. This module shall also include annual maintenance, replacement, and repair costs based on related data bank prescribed in D.3.3, Task 2-3: System and Component Unit Data Base.
- Module C-IV. SCENARIO COMPARISON and ANALYSIS: This algorithmic routine enables the user to consider, evaluate and compare a diversity of different alternative bundles of renewable energy systems and resources in different load sharing modes(based on request by the user) in order to reach a better optimality. This algorithm shall be limited to do simple loops that repeat the process of analyzing a single set of alternative bundle at a time and listing the results such that the user may deduce the optimal solution among the alternatives by using his/her own technical, economical, and environmental expectations and priorities. In other words this routine shall support the user decisions.
- Module C-V. RESULTS AND OUTPUTS: In this module, the performance level in terms of all evaluation metrics (See Annex I) derived from all calculations, data and analyses obtained are reported. If the exergy analysis option is selected by the user, this algorithmic unit shall carry out the, calculations according to REMM (Rational Exergy Management Model, See Annex I). Fast-track results are reported separately with a cautionary remark that the calculations may be highly approximate.
- **Module C-VI. ALGORITHM AND METRIC DEVELOPMENT:** This modular layer internally prepares feedbacks for related rules and regulations and the algorithm itself based on the interpretations made internally on the entire data structure. It further prepares and stores in suitable formats the information regarding to the development of possible new metrics about the system performance.

#### C.I.2 Brief description of preparation of tender document including the technical specifications

During the course of works, the requirements of the RET Software tool will be specified. The specifications shall cover the below:

- Definition of the functional requirements (features) of the system including all relevant interfaces' information acquisition and presentation components
- Definition of the authorized users of the system along with their roles and permissions in the system
- Definition of the non-functional requirements such as the performance and security requirements
- The software requirements specifications shall be defined in an internationally approved and common standard such as the IEEE STD 830-1998 Recommended Practice for Software

Requirements Specifications Standard which shall be agreed by the Employer during the inception phase.

- The preliminary design of the RET-EAT Software, with respect to an approved international design specification standard, defining the software platform and architecture, specifying the Internet web based interfaces of the system and relevant administrative software tools and interfaces
- The preliminary Database design in an internationally used method such as Entity Relationship Diagrams (ERD) that will be later used as the basis for the RET-EAT Data Storage and Management.

## C.2 Brief description of Stage II works:

The Contractor will provide consultancy and monitoring services to the Employer and/or Project Partners during tender evaluation process for the evaluation of the bids.

The Contractor will also provide consultancy and monitoring services to the Employer and/or Project Partners during the entire course of software development works and will also cooperate with the Contractor that will be chosen to develop the RET-EAT Software.

# D. DETAILED SCOPE OF SERVICES, EXPECTED OUTPUTS AND TARGET COMPLETION DATES

#### **D.1 Detailed Scope of Services**

#### **D.I.I Basic Considerations**

The Contractor shall, with due care and diligence, and in accordance with the provisions of the contract, undertake the works and perform the complimentary activities in considerations with the followings:

- The prime consideration of the RET-EAT development works is to reduce primary energy consumption and associated GHG emissions in Turkey,
- The tool shall serve as a main guidance and quantification mechanism for future energy efficient building studies and utilization of renewable energy in buildings in Turkey
- The RET-EAT and its development works should contribute to modifications in legislative requirements for the use of RET and EE technologies in buildings

#### D.I.2 General Standards and Requirements

The following requirements and standards will be taken into consideration for defining of algorithm and preparing of Terms of Reference:

- Unit system of the project will be SI unit system. Any variables, coefficients, equalities or inequalities in the form of other unit systems will not be used. If conversion of data in the

form of other unit systems is needed, unit conversions will be presented in an algorithmic structure in accordance with international standards,

- All of the studies conducted and specifications prepared will be independent of any existing software languages or platforms,
- Hourly building loads that are either externally provided as fixed data to the data bank (Method 2) or calculated in this tool by the Fast-track Algorithm (Method 1) shall be used,
- The file transfer methodology for the importing of the hourly load values of the buildings will be in an internationally standardized format and a markup language specification such as XML to be decided in cooperation with the Employer,
- The developed and specified algorithms will be documented in an academically eligible format which will be shared with the public for these feedback and improvement proposals.

The Contractor will perform the activities generally in accordance with the relevant and applicable norms and regulations of Ministry of Energy and Natural Resources and the Ministry of Environment and Urbanism, but enhanced with international standards, specifications and directives acceptable to the Employer and/or the key project partner agencies.

The following codes, standards and regulations should be considered as reference during the implementation of the Assignment, which shall not be limited to below:

- Building Energy Performance Regulation (BEP: See Annex V), MoEU,
- Energy Performance for Buildings Directive (EPBD), EU,
- Standard of Thermal Insulation Requirements for Buildings (TS 825),
- Specification for Architectural and Engineering Design Services, MoEU,
- Mechanical Design Codes of Chamber of Mechanical Engineers, TMMOB/UCTEA,
- Electrical Design Codes of Chamber of Electrical Engineers, TMMOB/UCTEA,
- Surveying Codes of Chamber of Surveying Engineers, TMMOB/UCTEA,
- General Technical Specifications, MoEU,
- General Technical Specifications of Turkish Electricity Distribution Company (TEDAŞ),
- Environmental Impact Assessment (EIA) Regulation, MoEU,
- Regulation for Natural Gas Installations, EPDK (Energy Market Regulatory Authority),
- Related EN Standards (i.e. EN 13779 for Heating, Ventilating, and Air Conditioning of EU).

#### **D.I.3** Activities

The main activities to be fulfilled by the Contractor will be carried out in in 2 stages and in 5 steps as outlined below:

#### STAGE I:

Step 1: Inception Phase,

Step 2: Algorithm Development Phase,

- Data Management Module,
- System Analysis Module
- Evaluation and Reporting Module

Step 3: Software Requirements Specification Phase,

Step 4: Preparation of tender document including TOR,

## STAGE II:

Step 5: Consultancy and monitoring services during bid evaluation and software development.

The Contractor shall commence and complete the works required through this RfP within 24 months The first 11 months is assigned for the algorithm development and preparation of tendering documents for the RET-EAT software development works; the following 13 months period is allocated for the provision of monitoring and consultancy services during tender evaluation and RET-EAT software development works. These time periods **include** the time required for administrative approvals.

At the relevant milestones, within or at the end of the above-defined steps, the Contractor will obtain feedback and/or approval of the Employer and/or key project partners. For each step, the feedback periods are described at the end of the below relevant steps (for D.1.3.1-D.1.3.5) of this ToR document.

## <u>STAGE I</u>

#### D.1.3.1 Step-1: Preliminary Analysis and Inception Phase

The Contractor (with the participation of Team Leader and the relevant key experts) and the Employer (UNDP), project partner agencies (i.e., GDRE and MoEU) and PMU will meet in Ankara for the kick-off meeting at most 5 days following the signing of the Contract.

In this meeting, PMU will brief the Contractor and its key experts on the project, and parties will go over the Terms of Reference and the Contractor's technical proposal with a view to agree on the general timeframe and the expected deliverables.

The Employer and/or key project partners (i.e., GDRE and MoEU) shall furnish the Contractor (successful Offeror) with the available supporting information regarding the project such as beneficiary's requirements and needs assessments, limits of budgeting etc.

**1-1** An Inception Report will be submitted to the Employer by the Contractor describing (a) collected information from relevant institutions (e.g. Employer, project partner agencies, local and national authorities/administrations, PMU etc.); (b) evaluation of the compiled information; (c) comments on the <u>missing</u> and further required information; (d) presentation of the scope and methodology for the services, (e) proposed work schedule and deliverable timeline.

The Contractor shall prepare the *Inception Report* and submit to the Employer. The employer returns to the contractor with feedbacks in a time period of not more than one week. After the feedback provided by the Employer and relevant stakeholder, the necessary improvements to the report shall be made by the Contractor within one week and resubmitted to the Employer. The resubmissions and approval procedure may not exceed three weeks. Within this maximum period resubmissions and feedbacks may be repeated to finalize the Inception Report.

#### **Deliverables:**

Inception Report containing:

- Report on meetings held, information compiled and results with respect to the project objectives,
- Scope and methodology of the work,
- Revised work flow and work schedule, including list and schedule of deliverables,
- Identified problems and proposed mitigation measures,
- Resources, management strategy, cost-control and quality-control strategies.

#### D.1.3.2 Step-2: Algorithm Development Phase

The Contractor is responsible to carry out all phase activities mentioned below. Phase activities are grouped in three categories, namely A, B, and C, which are described in detail in Figure 4.1.

Figure 4.1: Conceptual description of the works for algorithm development

	ALGORITHM DEVELOPMEN	IT PHASE
MODULE A - DATA MANAGEMENT	MODULE B - SYSTEM ANALYSIS	MODULE C - EVALUATION AND REPORTING
2.1 METEOROLOGICAL DATA BANK	2.8 PERFORMANCE METRICS DEVELOPMENT	2.12 ENERGY EFFICIENCY CALCULATION ALGORITHM
FEATURES DATA BANKS 2.3 SYSTEM AND COMPONENT UNIT	2.9 TEST OF THE ALGORITHM FOR SUSTAINABLE SYSTEM SIMULATION 2.10 THREE SEPERATE SYSTEM OPERATION SCENARIOS 2.11 FAST-TRACK CALCULATION ALGORITHM CENTER OF THE ENTIRE ALGORITHM Establishment of the hourly operating Simulation and Raw Analysis Data	2.14 CO2 EMISSION PREDICTION ALGORITHM 2.15 BUINDUING OF SUSTAINABLE SYSTEMS/FOUIPMENT
COST DATABASE 2.4 FINANCIAL DATABASE 2.5 PROJECT/BUILDING PARAMETERS		SCENARIOS (10 scenarios x 5 load sharing) 2.16 ENERGY AND COST ESTIMATION ALGORITHM 2.17 ECONOMIC ANALYSIS AND PAY BACK ESTIMATION
DATABASE 2.6 BUILDING HOURLY ENERGY LOAD DATABASE		ALGORITHMS 2.18 COST CALCULATION ALGORITHM
2.7 BUILDING HOURLY RET UTILIZATION DATABASE		2.19 EVALUATION AND VISUAL/INTERACTIVE, COMPUTER-ENVIRONMENT/PRINTED RESPORTS AND STATISTICAL INFORMATION PREPARATION ALGORITHMS
		2.20 THE USE OF THE EVALUATION METRICS ALGORITHM
Hourly-based Building System Loads/		2.21 DATA ARCHIVING/FILE PREPARATION AND STORAGE ALGORITHMS
Performance Analysis/ Economic Evaluation/ Reporting/Energy and Fuel Price Predictions/		2.22 BUILDING BENCHMARKING PREPARATION ALGORITHMS
Equipment Prices/Basis for Benchmarking		2.23 FEED-BACK INFORMATION REPORT PREPARATION ALGORITHM
		<ul> <li>A sample pre-algorithm functioning test program set based on a service building,</li> <li>Preparation of final report,</li> <li>Revision with respect to report feed-back.</li> </ul>
		DECISION SUPPORT MECHANISM System Energy Savings/Environmental Consciousness/Economy/ Scenario Comparison and Analysis/Results and Outputs/ Algorithm and Metric Development
## Module A: Data Management Module

In this step, algorithmic and contextual sub structures of databases and data sets, which consist of all raw, semi-processed and processed data used in project software, will be prepared. Required data input, data processing and data storage activities will be organized with interactive man-computer interface where it is needed. Although work of filling up data banks and data sets is out of this project's scope, in order to verify the operation of algorithm and sub-algorithms, minimum 3 kinds and 3 different (3x3=9 different entries) sample data for every renewable energy system will be collected. These sample data will be entered into system, in compliance with required level and quality for the final trial set stated in Work Package 3-12. Nonetheless, in the scope of this project, contractor will document and provide all sorts of information, document, literature and explanation that will help project writer in the following programming phases.

The definition of the database structure and metadata of the A-Data Management Module will be specified. The specifications which include, the sources, amount, acquisition frequency (if any), completeness, accuracy etc. of the data shall be presented within progress and final reports for the Algorithm Development Phase.

These reports should include the Entity Relationship Diagram (ERD) of the database, which defines the relations among the different data tables and forms the basis for the information system development.

Sub Task	Definition	
2-1	<b>Meteorological Data Bank:</b> Fundamental structure of the data bank which consists of hourly dry and wet bulb temperatures, relative humidity, atmospheric pressure information, covering the entire Turkey, will be developed. Algorithms of how and where these information will be obtained and how programming algorithm of updating, correction, verification and addition will be prepared and information of at least 10 province centers will be entered to a sample sub-program. The algorithm, which provides real time usage and seamless integration of this information into the other parts of the main algorithm, will be developed in appropriate units (SI) and nomenclature. This data bank shall also include heating degree-hour and cooling degree-hour values for Turkish cities and towns published by DMI. These data shall be arranged by the contractor in a separate data base and shall contain the unit costs of renewable/sustainable systems and equipment only.	
2-2	<b>Component and System Features Data Banks:</b> Blank data banks, which cover whole components and systems in number and content, will be generated. Method, interface, resource and data entry safety of filling information in these data banks and data verification systematic will be developed on algorithmic base. As a case study, sample software providing minimum 10 different renewable energy technologies and/or energy-efficient system and component data entry will be developed and the data will be entered. During the application, user data entry safety and data verification techniques and authorization systematic will also be algorithmically developed. Required input data for	

	every system and component will be determined and common definitions (such as polynomial expression of energy efficiency variation according to load or meteorological conditions), interfaces/algorithms will be developed.		
2-3	<b>System and Component Unit Cost Data Base:</b> Interfaces which provides entry of unit costs of components and systems, including maintenance, repair and replacement costs, mentioned in 2-2 to the data bank will be defined. Transfer method and infrastructure of automatic updating of information in 6-month periods regarding necessary unit costs from the web-based MoEU database will be developed.		
2-4	<b>Financial Database:</b> The real and estimated fuel and energy prices will be stored in the database, which will be periodically updated using the algorithms in Module 2. These price figures will serve as the basis for the economic analysis and reporting algorithms.		
2-5	Project/Building Parameters Database:		
	In a hierarchical relational database structure, system and equipment data will be stored by defining all required parameters and data fields. The information on the analyzed building/project will include:		
	<ul> <li>All required project parameters, including location and detailed user information,</li> <li>the RET components and system/equipment selections including their project specific variables,</li> <li>the reference to the hourly energy load database (Method 1 or Method 2),</li> </ul>		
	This database structure will have sufficient flexibility such that this structure maybe modified by the administrator and/or the user (pending administrator approval) for cases where new parameters of data fields will need to be stored by the system.		
2-6	Building Hourly Energy Load Database:		
	In Method 1, hourly degree-hour information shall be used to generate hourly building load data. Latent cooling loads however shall be a certain amount of the sensible cooling loads according to a methodology to be developed by the contactor taking into account several factors including but not limited to the climatic point, season of the year, building type, and function. Domestic hot-water loads shall be also predicted according to the season, building type size, and function. Electrical loads may be broken down with annual or seasonal loads by an algorithm to be developed by the contactor.		
	In Method 2, the fixed hourly building load data shall be imported into the RET-EAT from an external energy modeling simulation tool's output file. The data set shall include the heating, cooling, electricity, hot water, steam, cold water consumption amounts in kWh unit for each hour in the year. The format of the data to be imported shall be specified and if necessary. Data format conversion and pre-processing sub-routine will be prepared according to the format designed for the algorithm input face.		

2-7 <u>Building Hourly RET Utilization Database:</u> Based on the available building information, RET Tool parameters, hourly building loads and the results of the calculation algorithms, a data set will store hourly based information on the energy saved in kWh unit from each of the independent or combined RET systems/equipment in the building. This database will have reference to the project; RET component, hourly and yearly information and the amount of energy supplied by them in a broken-down form and summations. The database will store information for the 3 different scenarios of the analysis.

The Algorithm Development Phase progress and final reports shall include information regarding Subtasks from 2-1 to 2-7, included.

# Module B: System Analysis Module

In this step, necessary commands, algorithmic arrangements and rating processes will be carried out for generation and updating of information and data; admission of user and/or library entry of information and data; directing, processing, analyzing and calculating the information; generating and reporting the results; and generating categorized feedback data base.

Sub Task	Work Definition			
2-8	<b>Performance Metrics Development:</b> Performance evaluation metrics will be developed for each RET and energy efficient equipment/system according to first and second laws of thermodynamics. RET systems dimensions, calculation functions, if any inequality values, dimensional limits and their relations with database variables will also be defined.			
2-9	Test of The Algorithm For Sustainable System Simulation: An algorithm shall be described, which is based on the hourly building loads and shall calculate the necessary hourly operating hours of RET systems and equipment, related energy loads, efficiencies, consumption values and similar relevant parameters.			
	This analysis algorithm shall also permit to factor in the local effects on the wind and solar radiation data based on the site and specific environment conditions.			
2-10	Three Separate System Operation Scenarios: Each scenario shall define a separate cluster among all provisional RET and energy efficient equipment/system. Each scenario will include the logical basis and algorithm for decision making regarding the startup and operational priorities on an hourly basis (a sample is given in Annex III).			
2-11	<b>Fast-track calculation algorithm:</b> A fast-track algorithm shall also be developed. This algorithm shall substitute other algorithms whenever requested. Yet this method may be highly approximate. In this algorithm, heating loads shall be directly based on heating degree-hour values and the overall U (heat-transfer coefficient of the building envelope) value of the building. Electrical loads shall be inputted by the user on a yearly total basis.			

Cooling loads shall be calculated by the cooling degree-hour values. Because the cooling degree-hour method only gives the sensible cooling loads, it must be adjusted by a factor of 1,75 for Aegean, Marmara, Mediterranean, and South East Anatolia, and by a factor of 1,4 for other remaining geographic regions of Turkey. These factors are based on a 50% fresh outdoor air. Standard base temperatures shall be 24oc for comfort cooling and 22oC for comfort heating.

The Algorithm Development Phase progress and final reports shall include information regarding Subtasks from 2-8 to 2-11 included.

# Module C: Analysis, Calculation and Evaluation, Reporting Module

In this work package, in addition to energy efficiency, optionally exergy efficiency and total CO<sub>2</sub> emission predictions, evaluation charts and algorithms for a period of 10 years predictions of energy and fuel costs, economy calculations, additional investment costs, pay-back year calculations will be prepared, a report within the scope of whole main algorithms will be prepared and required assessments, suggested technical information and literature support about programming activities in further stages will take place in this report. Furthermore, by developing required methods for classifying and archiving of all information of evaluated buildings, generating data sets, developing building benchmark and feedback, algorithms about these methods will be prepared.

Sub Task	Work Definition
2-12	<b>Energy Efficiency Calculation Algorithm:</b> In this algorithm, regarding the building hourly loads concerning systems and components installed/going to be installed within the renewable energy systems structure, three operation scenarios prepared in Work Package 2-9 will be analyzed on an hourly basis (See Annex IV). The predicted savings from hourly fuel and energy consumptions will be calculated in hourly-basis compared to the reference base scenario for the system (no renewables) described in See Annex VI. The factors such as the systems and components which are put into use or not according to their operation scenarios or meteorological conditions (as an example, shutting down of wind turbines when there is no adequate wind or no electricity production in photovoltaic cells in night time), and furthermore, efficiency losses of components and systems that work in its partial capacity, capacity losses that occur due to meteorological conditions (like cogeneration systems) or change in COPs of heat pump with respect to demanded temperatures, will all be taken into consideration. Performances of these components will be corrected according to data given in Work Package 2-2. Hourly energy and fuel savings or losses corresponding to every three scenarios will be converted to monetary cost depending on that year's predicted fuel and energy costs. A simple CO <sub>2</sub> emission decreases will be calculated connected with fuel and energy savings. Algorithms of all of these

	activities will be developed in this work package. Storage of excess thermal energy will be in the scenarios as an option. Electricity cost predictions will be arranged according to double or triple electricity price schedules if it is applied in that zone. On/off load tracking specifications of equipment, especially electricity-producing equipment like cogeneration plants (combined heat and power) will be updated in hourly based, according to the electricity price schedules.
	In consequence, transferring hourly savings to the three scenarios x 3 cost prediction matrix, most and least profitable probability cases out of 9 probabilities will be reported and a reliability analysis will be carried out. All of the results will be arranged as they can be reported in hourly, daily, weekly, monthly and annual basis and all required algorithms of these will be developed and reported, whole flow charts and programming steps will be declared. This last activity is valid for all Work Packages and Sub -Work Packages. A sample analysis chart is shown in <b>Annex IV</b> .
2-13	<b>Exergy Efficiency Calculation Algorithm:</b> This Sub Work Package depends on administration or user's choice. When this option is used, exergy efficiency will be calculated in a similar approach to <b>2-10 Package.</b> Rational Exergy Management Model, equalities and calculation method will be used in this algorithm.
2-14	<b>CO<sub>2</sub> Emission Prediction Algorithm:</b> In the case of validation of 2-11 option, this work package will be arranged as it is activated during usage and emissions will be calculated in hourly basis. Cost of emission savings in carbon market will be calculated in annual basis.
2-15	<b>Bundling of Sustainable Systems/Equipment Scenarios (10 scenarios x 5 load sharing):</b> This unit shall generate a maximum number of ten different bundling (composition of renewable systems and equipment) scenarios regarding different systems and equipment and five load sharing scenarios. This 10 x 5 matrix of combinations shall be analyzed on a one-by-one basis loop of a calculation and evaluation sub-algorithm, which outputs economical merit, investment cost, pay-back period, energy efficiency, annual share of energy supplied by the renewable energy systems and equipment in the annual total consumptions in a broken-down format in terms of individual RET systems and equipment besides the total share, CO <sub>2</sub> emissions reduction figures in the form of tables, figures and a visual/written (on demand) report.
2-16	<b>Energy and Cost Estimation Algorithm:</b> Algorithms that use three different estimation models with regard to past 10 years data will be developed and they will be updated in every three months. Fuels: Natural gas, coal, lignite, fuel-oil, gas, diesel and liquid natural gas. Estimation algorithm will be prepared based on local fuel cost estimations, especially for solid fuels.
2-17	Economic Analysis and Pay Back Estimation Algorithms: After cost of energy and fuel

savings is calculated, these algorithms will be developed in order to calculate additional investment costs of all systems and components, which contribute to these savings directly / indirectly. Energy and fuel savings and additional investment costs will be used in simple pay back year calculations. So, pay back years algorithm will be prepared. This algorithm will be developed as showing two optimistic and pessimistic pay back year according to cost values obtained from 3x3 matrixes in 3-1 Sub Work Package. Moreover, these calculations may be displayed separately for each energy saving system or component.

- 2-18 <u>Cost Calculation Algorithm</u>: Algorithms related to all kinds of cost calculations and estimations in **Sub Work Package 2-15** will be prepared on components basis.
- **2-19 Evaluation and User Friendly Reports Preparation Algorithms:** In this work package, all necessary and relevant algorithms that will enable the user to follow, visualize, compare all the results, interactively change some data (only by authorized users) and compare their impacts on the results, receive printed results on these items, prepare output reports, electronic storage, transmittal/sharing, printing and archiving, reduction and interpretation of the results and collection of all information after their categorization, in electronic storage and retrieval media shall be prepared.
- **2-20** The Use Of The Evaluation Metrics Algorithm: Standard metrics of the building regarding environmental, economic and energy/exergy efficiency will be developed, related and potentially useful metrics will be surveyed in the literature and an array of evaluation metrics will be developed. The algorithm shall also be open to future updates, developments, and improvements of the metrics and shall include algorithmic write-ups for such purposes.
- 2-21 Data Archiving/File Preparation and Storage Algorithms: Described in the above work packages.

**2-22** Building Benchmarking Preparation Algorithms: Once sufficient data will be collected in the future programs using these algorithms a building benchmarking system will be established. In order to lay down the foundation of this future objective a building performance benchmarking and information storage data base preparation algorithm will be developed.

**2-23** Feedback Information Report Preparation Algorithm: For the case of once the program to be developed in the future steps using the algorithms described herein will be kept to be used, a dedicated feed-back algorithm from then on will be devised, which will be able to establish a data bank regarding collection, store, and evaluation of the future problems of the program, user inputs, and complaints.

2-24 After the algorithm is developed, a sample pre-algorithm functioning **alpha test program set** based on a service building in respectively Ankara, İstanbul and Erzurum according to the general data prepared by the administration in the last month of the project will be written. By using these case data, the contractor will run the program for a typical summer day (21 August) and a typical winter day (21 January) within 24 hours of periods on an hourly basis, generate a report of results and modify the algorithms with respect to necessary development, arrangement, and update.

During the Algorithm Development Phase, three (3) separate "Progress Reports" and one (1) "Final Report" shall be prepared and include information regarding Sub-tasks from 2-12 to 2-24. In case of urgency, ad hoc reports can also be submitted.

These reports should describe the overall progress of the Algorithm Development Phase, including specific sections regarding the progress on Module A, Module B and Module C. The key issues to be addressed in these reports shall include, as minimum;

- Level of progress regarding algorithm and data structure definitions,
- Sample working sets,
- Quality of works,
- Implementation of work program
- Use of resources, contract administration and cost control.

These reports shall contain sections on;

- Cumulative progress achieved during the last reporting period,
- Progress planned for the next reporting period,
- Any encountered problems and the proposed solutions.

The reports must also include minutes of any meetings between the parties, any other special activity such that missions outside the project location, workshops, training seminars, press conferences etc. held regarding the project.

The percent completion of the Algorithm Development Phase shall be presented in graphical form showing a comparison between actual and scheduled values (as per approved work schedule) from commencement of the Works.

Submittals of the Contractor and approvals of the Employer should also appear in the Progress Reports.

# **Deliverables:**

- 3 separate Progress Reports and 1 Final Report "Algorithm Development Phase" including
  - Algorithm and data structure definitions
    - Data structure and preliminary database design
    - System analysis algorithms
    - Evaluation and Reporting Algorithms
  - o Development and submission of sample working set
    - Sample work analysis result report

# D.1.3.3 Step-3: Specification of Software Requirements

Within the work package, the requirements of the RET-EAT software will be specified.

Sub Task	Work Definition				
3-1	Specification Of The Software Platform: The software architecture of the new system share be defined including,				
	<ul> <li>The types of platform for the users such as web or mobile capable interfaces</li> <li>The types of platform for the administrative users, such a newly developed desktop application</li> <li>The type of layers needed for the system, such as the interface, business logic and mathematical processing, database layers</li> <li>Possible development languages and mathematical libraries to serve the purpose</li> <li>The network architecture requirements to provide the sustainability of the service such as the redundant servers and backing up systems of the servers</li> <li>Definitions of main possible information flows and information in forms such as use case scenarios or flow charts</li> </ul>				
	These specifications shall be reported to the Contractor.				
3-2	Specification of the software requirements with respect to a globally recognized standard such as the IEEE STD 830-1998 Recommended Practice for Software Requirements Specifications. The specifications shall include:				
	<ul> <li>Definition of the users, their roles and permissions</li> <li>All functional requirements of the software including the functions and related interfaces for the users and administrators, the reporting capabilities and interfaces</li> <li>All non-functional requirements of the software including performance, security, logging and similar requirements</li> </ul>				
3-3	The requirements for the sustainability of the system shall be reported specifying the requirements for the operation of the software system, including:				
	<ul> <li>The personnel requirements for the data management and up keeping of the system</li> <li>The software maintenance requirements of the system</li> <li>The possible algorithm and data structure modification requirements of the system</li> </ul>				

# **Deliverables:**

- Software architectural requirements report
- Software Requirement Specification, SRS
- System sustainability specification report

## D.1.3.4 Step-4: Preparation of ToR

After completing all the steps regarding RET-AT development works, the Contractor shall make up two separate and full-fledged tender dossiers compromising of:

- Software requirement specifications
- Algorithms specifications
- Proposed software architecture and database structure requirements

## STAGE II:

## D.1.3.5 Step-5: Consultancy and Monitoring Services

The Contractor who will be responsible for developing the algorithm and the tender document for software development works will also provide consultancy and monitoring services during tender evaluation process and software development works.

## **Bid Evaluation Report:**

The Contractor shall provide consultancy services to the Employer and/or Project Partners during evaluation of the bids. A bid evaluation report will be prepared by the Contractor for this purpose.

## **Consultancy and Monitoring Reports:**

The Contractor who will be responsible for developing the algorithm will closely work and cooperate with the Contractor that will be chosen to develop the RET-EAT Software. In this respect, both contractors shall have regular meetings on a bi-weekly schedule during the entire course of software development project.

6 separate Consultancy and Monitoring reports shall be prepared electronically following the meetings and/or collaboration with the Contractor of RET-EAT software development project works. The meetings and/or collaboration will be conducted by the Contractor's expert(s) upon the request of the Employer during the software development period.

The Consultancy and Monitoring reports to be prepared shall include the findings of the expert(s) during the meetings and/or collaboration and provide his/her recommendations, if any corrective measures are to be taken especially to ensure compliance of the software with the intended algorithm. These reports might also include proposals for change orders regarding the software development works.

**Deliverables:** Bid evaluation report, six (6) separate Consultancy and Monitoring reports.

# **D.2 Expected Outputs and Target Completion Dates**

## D.2.1 Main Deliverables

The following table lists the activities and deliverables against required timeframes. The "Deliverables" are the minimum requirements and will be supplemented and complemented by additional studies/annexes, as appropriate.

Table 4.1: Main Deliverables and	d Estimated Target Dates
----------------------------------	--------------------------

Stage	Step	Phase	Deliverables*	Estimated Submission Dates
	1	Inception Phase	Inception Report	Day 20
	2	Algorithm	Progress Report # 1	Day 70
		Development Phase	Progress Report # 2	Day 120
			Progress Report # 3	Day 170
			Final Report	Day 225
	3	Specification of	Software Architectural	Day 275
•		Software Requirements	Requirements Report	
		Development Phase	Software Requirement	
			Specifications	
			System Sustainability	
			Specification Report	
	4	Preparation of ToR	Complete tender dossier	Day 325
	5	Consultancy and	Bid Evaluation Report	Day 450
		Monitoring Services**	Consultancy and Monitoring	Day 505
			Report # 1	
			Consultancy and Monitoring	Day 545
			Report # 2	
			Consultancy and Monitoring	Day 585
11			Report # 3	
			Consultancy and Monitoring	Day 625
			Report # 4	
			Consultancy and Monitoring	Day 665
			Report # 5	
			Consultancy and Monitoring	Day 705
			Report # 6	

\*UNDP may require additional Annexes as applicable.

\*\*The submission dates indicated in this table for Step 5 are based on the successful and timely completion of tender process for the software development, the signature of the contract with the vendor to be identified and the commencement of the software development project works. Therefore the estimated timeframe for Step 5 may shift according to the actual provision of Software Development services.

## **D.2.2 Language of Deliverables**

The deliverables shown in Table 4.1 shall be prepared both in Turkish and in English. It is the responsibility of the Offeror to translate the documents to English/Turkish and the cost of translation shall be included in the price offer.

# E. INSTITUTIONAL ARRANGEMENT

# E.1 Submission, Evaluation and Finalization of Deliverables for Stage I

The Contractor will submit the deliverables in accordance with the "Deliverables and Estimated Timeframes Table" (Table 4.1) in Section D.2 of the Terms of Reference.

The deliverables will be submitted by the Contractor to the employer and the project partner agencies. The deliverables will be evaluated by the employer and the project partner agencies. The Employer will coordinate the evaluation and gathering of feedback from the project partner agencies. The Employer returns to the contractor with feedbacks in a time period of not more than one week. After the feedback provided by the Employer and the project partner agencies, the necessary improvements to the report shall be made by the Contractor within one week and resubmitted to the Employer and the project partner agencies. The resubmissions and approval procedure may not exceed three weeks. Within this maximum period, resubmissions and feedbacks may be repeated to finalize the deliverables.

# E.2 Consultancy and Monitoring Reports for Stage II

The Consultancy and Monitoring Reports will be submitted by the Contractor to the employer and the project partner agencies. The deliverables will be evaluated by the employer and the project partner agencies. The Employer will coordinate the evaluation and gathering of feedback from the project partner agencies. The Employer returns to the contractor with feedbacks in a time period of not more than one week. After the feedback provided by the Employer and the project partner agencies, the necessary improvements to the report shall be made by the Contractor within one week and resubmitted to the Employer and the project partner agencies. The resubmissions and approval procedure may not exceed two weeks. Within this maximum period, resubmissions and feedbacks may be repeated to finalize the deliverables.

# F. DURATION OF THE WORK

The Assignment is *envisaged* to start in June 2014. Service periods for different components of the contract are as follows;

# F.1. Stage I: Inception, Algorithm Development, SRS and ToR Preparation

The scope of the services for Stage I of the project shall be completed in 11 months from the commencement date. Out of this 11 months period, 7 months are envisaged for Algorithm Development works and Preparation of Tender Files. Maximum 4 additional months are envisaged for the technical and administrative approval of the deliverables by UNDP and Project Partners.

# F.2. Stage II: Consultancy and Monitoring Services

The total duration for Stage II regarding consultancy and monitoring services is expected to be 13 months.

The tendering procedure is expected to take 4 months out of the 13 months. During this period, the nature of the consultancy services to be provided is supporting tender evaluation process for the

selection of a legal entity to carry out RET-EAT software development works.

The Contractor shall also provide consultancy and monitoring services in the course of implementation of the software development project works. The experts of the Contractor shall carry out monitoring, consultancy and reporting services upon request of the Employer. The subject services are expected to start upon tendering of software development works and to be completed within 9 months.

Out of this 9 months period, 5.5 months are envisaged for provision of Consultancy and Monitoring services. Maximum 3.5 additional months are envisaged for the technical and administrative approval of the deliverables by UNDP and Project Partners.

# G. LOCATION OF WORK

Location of the Assignment is Ankara, Turkey and the Offeror's home-base. The Contractor will participate in several meetings with UNDP, the Project Partner Agencies and the Contractor, who will be responsible for RET-EAT software development works, during Stage I and Stage II, as explained below:

# G.1 Meetings for Stage I: Development of the Algorithm and Relevant Required Annexes for the RET-EAT Software Development Tender,

The Team Leader and/or relevant key personnel will attend the below meetings through Step 1-4 (Clause D.2.1, Main Deliverables) to be held in Ankara to brief UNDP and the Project Partner Agencies as indicated in Annex 7:

- a. One (1) kick-off meeting at the beginning of Step 1 Inception Phase,
- b. One (1) follow-up meeting upon completion of Step 1 Inception Phase,
- c. Three (3) interim progress meetings during Step 2 Algorithm Development Phase,
- d. One (1) follow-up meeting upon completion of Step 2 Algorithm Development Phase,
- e. One (1) follow-up meeting upon completion of Step 3 Specification of Software Requirements Development Phase,
- f. One (1) follow-up meeting upon completion of Step 4 Preparation of ToR Phase.

The meetings will take place in 5 days upon the submission of the respective deliverables.

The number of travels and travel periods are subject to change and can be mutually rearranged based on the circumstances and the needs.

# G.2 Meetings for Stage II: Development of the Software of the RET-EAT,

The Team Leader and/or relevant key personnel will attend several meetings during tender evaluation process and during software development project works for provision of consultancy and monitoring services to be held in Ankara to assist and to brief UNDP and the Project Partner Agencies as indicated in Annex 7:

- a. One (1) tender evaluation meeting for two (2) days,
- b. Several 1-day missions for collaboration with the RET-EAT software development contractor

during software development works,

The number of travels and travel periods are subject to change and can be mutually rearranged based on the circumstances and the needs.

# G.3 Additional Meetings

The Team Leader and/or relevant key personnel may also be requested to attend additional meetings during Stage I and Stage II (The number of the meetings may vary depending on the circumstances) with designated staff of UNDP and Project Partner Agencies.

Travel and accommodation costs for these additional meetings for Team Leader and/or relevant key personnel will be borne by UNDP and will be charged against the project budget. Travel costs (economy class flight and full board accommodation expenses at 4\* or higher hotel) for the additional meetings will be arranged and borne by UNDP through UNDP's official Travel Agency. No travel related expenses will be paid or reimbursed to the Contractor.

# H. QUALIFICATIONS OF THE SUCCESSFUL SERVICE PROVIDER AT VARIOUS LEVELS

# H.1 Contractor & Project Team

The Contractor shall provide adequate international and/or national staff in terms of expertise and time allocation as well as needed equipment in order to complete the activities required under the scope of the Assignment and to achieve the overall and the specific objectives of the Assignment in terms of time, costs and quality.

Contractor's personnel (i.e. experts to be mobilized by the Contractor to deliver the Assignment) that have a crucial role in implementing the contract are referred to as key personnel. <u>CVs, copies of diplomas, and relevant certifications of key personnel should be included in the Technical Proposal</u>.

Hereinafter, the profiles of the key personnel are presented. Note the minimum requirements and the assets. The minimum requirements refer to the qualifications that the personnel to be proposed by the Offeror should definitely possess.

- In the event that qualifications of a key personnel to be proposed by the Offerors do not meet one of the relevant minimum requirements, he/she shall secure zero (0) points from the evaluation.
- In the event that qualifications of **two or more key personnel** to be proposed by the Offerors do not meet one of the relevant minimum requirements the Offerors may be disqualified.
- UNDP possess the right to ask the Contractor to replace the personnel that do not meet the minimum requirements before contract signature. Signature of the contract will be bound by provision of an expert who fully meets the minimum requirements stated in the ToR. In such case, the contract price to be proposed by the Contractor will remain unchanged.

"Assets" are preferred qualities and qualifications of the personnel. Proposed personnel that possess the minimum requirements will obtain 70% of the maximum obtainable points, whereas proposed

personnel that also possess the "assets", in addition to all the minimum requirements, may secure up to 100% of the maximum obtainable points.

The list of key experts and required general/specific professional experiences are shown in the following table (Table 3.2):

## Table 4-2: Key Personnel

Toom Momborg	Education	Professional Experience (years)	
		General	Specific
Energy Efficiency and Renewable Energy Expert (Team Leader)	Energy or Mechanical Engineer	10	8
Renewable Energy Expert	Electrical or Mechanical Engineer	6	5
Financial Expert	Economist, Financial Expert	5	5
Information System Analysis and Design Expert	Engineer/IT/Mathematician	10	5

The Offerors are strongly encouraged to detail these job descriptions in their technical proposals to include the division of labor, reporting and coordination lines, etc.

The detailed job descriptions for each key personnel are given below;

## H.I.I Energy Efficiency and Renewable Energy Expert (Team Leader)

The Team Leader shall be responsible for the overall coordination of the implementation of the entire project activities, including but not limited to;

- Manage the team, coordinate the team of experts, and allocate the tasks,
- Maintain continuous communications with counterparts,
- Primary contact for all communications, elaboration and delivery of reports,
- Responsible for the delivery of all necessary inputs for ensuring proper implementation of the activities in accordance with governing rules and regulations,
- Responsible for the identification of eventual obstacles for the implementation of projects and taking necessary correcting action accordingly,
- Financial management and reporting, and other tasks as required
- Lead the goals of the Algorithm development, equipment efficiency, economy, performance and evaluation criteria;
- Lead the alpha tests per required in the ToR, evaluate and report the results implement and delegate all necessary corrections, modifications, deletions and additions to the algorithms concerned.

- Identify and suggest all the energy efficiency parameters, metrics and renewable energy system bundle options;

# **Required Skills and Experience**

	Minimum Requirements	Assets
General Qualifications	<ul> <li>University degree in Energy or Mechanical Engineering,</li> <li>Fluency in English</li> <li>Computer literacy</li> </ul>	<ul> <li>Graduate degree in a related field</li> </ul>
Professional Experience	<ul> <li>A minimum of 10 years of progressively responsible professional experience in project management, computer-based design, analysis, and evaluation of renewable energy systems</li> </ul>	<ul> <li>More than 15 years of experience</li> </ul>
Specific Experience	<ul> <li>At least 8 years of experience in mechanical system design of buildings</li> <li>Proven experience in the design of energy efficient buildings</li> <li>EnergyPlus, Design Builder, similar building simulation codes literacy</li> <li>Proven experience as the project coordinator and/or team leader</li> <li>Proven experience in thermal systems, renewable energy systems, energy storage, exergy, energy, thermodynamics, fluid dynamics or CO<sub>2</sub> emission calculations</li> </ul>	<ul> <li>More than 12 years of experience in design of buildings</li> <li>5 or more years of experience in international design contracts,</li> <li>Experience as the project coordinator and/or team leader of at least 1 international design contracts</li> <li>Proficient knowledge in at least one prominent software program such as Retscreen, Homer, SAM (System Advisor Model) and similar programs. Advanced skill in using and interpreting such programs</li> <li>Proven experience with heat pump, solar technology, cogeneration, wind energy, energy storage systems</li> <li>Have written or published papers, books or chapters regarding renewable energy systems and application in buildings.</li> </ul>

## H.I.2 Renewable Energy Expert

 Collection of characteristic parameters and classification of performance/economic data (with the economist) PV, PVT, Solar Collector, wind energy, heat pump technology, boilers, cogeneration systems, energy storage.

- Write all commands and steps of all algorithms, interfaces, and subroutines described in this document
- Develop all techno economical evaluation and rating metrics
- Verify and evaluate alpha test results
- Design and prepare data trees,
- Prepare all standard terminology, variable, vector, matrix names
- Prepare all logical and mathematical pointers (reverse and forward) in the data base and data processing/evaluation units
- Develop/adopt all fuel and energy price projection models with Information System Analysis and Design Expert and/or Financial Expert
- Develop the economic analysis tool algorithm with integrated format with all other sub algorithms and routines developed by him/her.
- Develop greenhouse gas emission models (including exergy analysis) and CO<sub>2</sub> emissions prediction algorithm and integrate these routines to the main algorithm
- Develop all user-machine interfaces and screen designs for easy, clear, fast, and understandable man-machine interfacing
- Prepare all program developer manuals to explain the details of all the algorithms to be prepared

	Minimum Requirements	Assets
General Qualifications	<ul> <li>University degree in Mechanical or Electrical Engineering</li> <li>Fluency in English</li> <li>Computer literacy</li> </ul>	<ul> <li>Advanced university degree from a related field</li> </ul>
Professional Experience	<ul> <li>A minimum of 6 years of progressively responsible professional experience in one or several fields of project management, computer-based design, analysis and evaluation of renewable energy systems, etc.</li> </ul>	<ul> <li>More than 9 years of experience</li> </ul>
<ul> <li>Specific</li> <li>At least 5 years of experience in mechanical and/or electrical system design of buildings</li> <li>Proven experience in the design of energy efficient buildings</li> <li>Proven experience in thermal systems, renewable energy systems, energy storage, thermodynamics, fluid dynamics or CO<sub>2</sub> emission calculations</li> </ul>		<ul> <li>More than 8 years of experience in mechanical and/or electrical system design of buildings</li> <li>At least 2 years of proven experience in international design contracts,</li> <li>Proven experience with heat pumps, solar technology, cogeneration, wind energy, energy</li> </ul>

# **Required Skills and Experience**

Minimum Requirements	Assets
<ul> <li>Proven knowledge and experience in PV, Solar Collector, wind energy, heat pump technology, boilers, cogeneration systems, energy storage</li> </ul>	<ul> <li>storage systems</li> <li>EnergyPlus, Design Builder, similar building simulation codes literacy</li> <li>Proven experience with software development/use environment like Retscreen, Homer, etc. Basic skill in using and interpreting such programs</li> <li>Have written or published papers, books or chapters regarding renewable energy systems and application in buildings</li> <li>Proven experience and knowledge in calculating greenhouse gas emission predictions</li> </ul>

# H.I.3 Economist - Financial Expert

- Develop the economic analysis tool (with the team leader and expert)
- Develop/adopt economic forecasting models
- Identify the economic parameters to be collected and used within the models and the analyses,

# **Required Skills and Experience**

	Minimum Requirements	Assets
General Qualifications	<ul> <li>University degree in Economy, Finance or other related fields</li> <li>Fluency in English</li> <li>Computer literacy</li> </ul>	<ul> <li>Advanced university degree from a related field</li> </ul>
Professional Experience	<ul> <li>A minimum of 5 years of progressively responsible professional experience in economic studies and/or feasibility analysis,</li> </ul>	- More than 8 years of professional experience
Specific Experience	<ul> <li>A minimum of 5 years of experience in the economic analysis regarding thermal systems</li> </ul>	<ul> <li>More than 10 years of experience in economic analysis and energy price predictions</li> <li>Proven experience as economist in at least 1 international building design contract</li> </ul>

Minimum Requirements	Assets
	<ul> <li>Proven experience with international government rules, incentives, fuel prices, energy resources</li> <li>Proven experience with economic analysis of thermal systems</li> <li>Field and market knowledge and experience in PV, Solar Collector, wind energy, heat pump technology, boilers, cogeneration systems, energy storage</li> <li>Proven knowledge of at least one economic analysis software and feasibility tool for any or compound renewable energy system design and application</li> </ul>

# H.I.4 Information System Analysis and Design Expert

- In coordination with the team leader and other key experts, carry out the complete analysis for the software, consulting and evaluating all stakeholders' comments and feedback on the RET-EAT software,
- Evaluate and present main information flow and user action scenarios with UNDP and/or project partners,
- Define of the requirements specification of the software with respect to the required standards,
- Define the way data will be imported and exported to the software system, including the metadata, acceptable formats for outside information etc.,
- Evaluate and define the way the algorithms can be best integrated to the software system and the database,
- Analyze and report the possible uses of various mathematical modeling and calculation tools for the possible integration with the system,
- Define and present the possible software and database architecture options for the proposed system,
- Define the sustainability requirements including the information and software system maintenance personnel requirements

# **Required Skills and Experience**

	Minimum Requirements	Assets
General Qualifications	<ul> <li>University degree in Computer,</li> <li>Software, Electronics or Electrical</li> <li>Engineering, Mathematics (or a</li> </ul>	<ul> <li>Advanced university degree from a related field</li> </ul>

	Minimum Requirements	Assets
	relevant field) - Fluency in English	
Professional Experience	<ul> <li>A minimum of 10 years of progressively responsible professional experience in working software analysis, design and development activities</li> </ul>	<ul> <li>More than 15 years of professional experience</li> </ul>
Specific Experience	<ul> <li>A minimum of 5 years of professional experience on software project management</li> <li>At least 5 years of experience in web based software systems analysis and design</li> <li>Proven experience of implementation of mathematical modeling and calculation algorithms within the software projects</li> <li>Proven experience within a complex stakeholder environment</li> </ul>	<ul> <li>At least 3 years of experience in international contracts on similar works</li> <li>At least 5 years of experience in the design of software systems benefiting from complex mathematical algorithms</li> <li>Experience with the Energy Performance of Buildings Directive and/or relevant regulations</li> <li>Proven knowledge of IEEE STD 830-1998 Recommended Practice for Software Requirements.</li> </ul>

# I. SCOPE OF PROPOSAL PRICE AND SCHEDULE OF PAYMENTS

The payments will be made on lump sum basis for the respective deliverables specified in Stage I upon the completion of necessary approval steps described under Section 4, E. Institutional Arrangement.

For Stage II, the payments will be based on the actual man/days spent for the completion of the respective deliverables. The contractor will be requested to submit timesheets along with the specified deliverable for the approval of UNDP.

Stage	Step	Phase	Deliverables	Estimated	Payment
Nr.	Nr.			Payment Date	Weight (%)*
	1	Inception Phase	Inception Report	Day 40	5
	2	Algorithm Development	Progress Report # 1	Day 90	30
		Phase	Progress Report # 2	Day 140	
			Progress Report # 3	Day 190	
			Final Report # 4	Day 245	
	3	Specification of Software	Software Architectural	Day 295	20
•		Requirements	Requirements Report		
		Development Phase	Software Requirement		
			Specifications		
			System Sustainability		
			Specification Report		
	4	Preparation of ToR	Complete tender dossier	Day 345	25
	5	Consultancy and	Bid Evaluation Report	Day 450	20
	Monitoring Services	Consultancy and Monitoring	Day 520		
			Report 1		
			Consultancy and Monitoring	Day 560	
			Report 2		
			Consultancy and Monitoring	Day 600	
П			Report 3		
			Consultancy and Monitoring	Day 640	
			Report 4		
			Consultancy and Monitoring	Day 680	
			Report 5		
			Consultancy and Monitoring	Day 720	
			Report 6		
		тот	AL	100%	

Milestone activities of the contract price are shown below:

# J. ANNEXES TO THE TOR

There are 8 Annexes to the ToR as below:

- ANNEX I. EQUIPMENT, SYSTEM and BUILDING PERFORMANCE EVALUATION METRICS
- ANNEX II. HIERARCHICAL DATA BASE STRUCTURE
- ANNEX III. ELECTRO-MECHANICAL SYSTEM OPERATON TEMPLATES TO TEST THE ALGORITHM
- ANNEX IV: HOURLY PERFORMANCE SIMULATION AND ANALYSIS ALGORITHM
- ANNEX V INFORMATION ON LEGISLATIVE BACKGROUND
- ANNEX VI BUILDING ELECTRO-MECHANICAL SYSTEM BASE SCENARIO
- ANNEX VII: ESTIMATED MEETINGS AND EXPECTED PARTICIPATION BY TEAM MEMBERS
- ANNEX VIII: ESTIMATED TIMELINE OF THE ASSIGNMENT (FOR STAGE I AND STAGE II)

## ANNEX I. EQUIPMENT, SYSTEM and BUILDING PERFORMANCE EVALUATION METRICS

Performance of all sustainable energy systems (SES, including energy efficient systems like CHP using fossil fuels or not), equipment, and components in the electro-mechanical system of the building will be compared to the Electro-Mechanical System Base Scenario according to the hourly loads during operation of the building. In space heating the base mechanical system involves central panel radiator heating system with outdoor temperature compensated condensing boiler with natural gas. (See **Annex 6**). In space cooling the reference system is vapor compression-cycle chillers operated with electric power delivered from the national power grid and fan-coils with condensate trays in the zones. In both cases it will be assumed that the electrical system demand of the building will be satisfied from the national power grid.

## Heat Pump

In order to calculate the primary fuel savings of any heat pump the Heating Coefficient of Performance  $(COP_{H})$  and the Cooling Coefficient of Performance  $(COP_{c})$  are considered first. These coefficients depend upon the resource temperature and the demand temperature at the application point, and must be expressed by second-order polynomials in terms of the difference of these temperatures for a given type or model of the heat pump available in the market. In this Project, an algorithm for the generation of a data base that will be used to store and process all the relevant information about a given heat pump performance will be developed according to the format described in Annex 2 such that all data and design information will be arranged in a specific format in addressable and directly accessible form and stored in this data base in vector arrangement. For the common base comparison, the heat pump in consideration shall be assumed to receive/expel heat from/to a ground (or air) source according to the mode of operation (heating or cooling respectively), depending on its type and model at the source temperature at that hour and deliver it to the panel radiators at a supply temperature corrected (compensated) with respect to the same outdoor temperature. In the cooling mode the supply temperature shall be fixed at 7°C (12°C return temperature). In the heating mode the return temperature shall be corrected according to the outdoor air temperature during that hour based on  $20^{\circ}$ C design temperature drop at 65°C design supply temperature. The hourly value of the COP<sub>H</sub> used in these calculations will be obtained from the second-order polynomial described above. In the cooling mode, the reference case will be based on grid electric power operated chillers. A similar algorithm for  $COP_c$  will be developed for the common base comparison of the heat pump during its cooling mode.

For all sustainable/efficient energy systems that may be described with a performance coefficient (*COP*) like heat pumps the main performance metric is the *Primary Energy Ratio*, *PER*. *PER* is the product of the coefficient of performance (*COP*<sub>c</sub>, or *COP*<sub>H</sub>) at a given hourly period and the overall energy conversion, power transmission, and distribution efficiency,  $\eta_T$  between the point where the primary energy source is inputted and the final point of energy use of the system like the heat pump.

$$PER = \eta_{\tau} \cdot COP \qquad \text{{for all systems with a definition of } COP}$$
(1-1)

For example, if the electric power for the heat pump comes from a distant thermal power plant this overall efficiency,  $\eta_{\tau}$  is the product of all energy conversion, power transmission and distribution efficiencies on the entire way between the power plant and up to the heat pump. For on-site sustainable/efficient power generation systems based on renewable energy systems like solar PV and

Wind Turbine Systems  $\eta_{\tau}$  may be taken unity. For on-site Combined Heat and Power (CHP) systems using fossil fuels,  $\eta_{\tau}$  may be taken equal to 1 times the power generation efficiency of that CHP. For example, if an on-site natural gas-engine CHP has a power generation efficiency of 0.4, then *PER* of a heat pump in the building deriving its power from that CHP will be 0.4 x *COP*.

# Combined Heat and Power System

It is not a necessity that CHP (Combined Heat and Power) and TG (Trigeneration: combined heat, power, and cold) systems operate on fossil fuels. A PVT (Photo-Voltaic Thermal) system using solar radiation is a perfect CHP system without any dependence on fossil fuels, because it generates both electric power and heat. In the same token if part of the electric power generated by an on-site wind turbine is utilized by a ground-source heat pump then this system is also a CHP.

For any fossil fuel-based CHP system, EU 20014/8/EC Directive defines a primary energy savings ratio, *PES*. This definition does not cover second law of thermodynamics and other outputs like steam, cold etc. In order to overcome this issue, a modified and extended  $PES_{RCHP}$  given by Eq. (1-2) must be used.

$$(1-2)PES_{RCHP} = \left[1 - \frac{1}{\left(\frac{\text{CHPH}\eta}{\text{RefH}\eta} + \frac{\text{CHPS}\eta}{\text{RefS}\eta} + \frac{\text{CHPE}\eta}{\text{RefE}\eta} + \sum \frac{PER}{RefPER}\right) \times \frac{(2 - \text{Ref}\psi_{RCHP})}{(2 - \psi_{RCHP})}\right] x 100$$

The reference value of the CHP or TG, namely Ref $\psi_{RCHP}$  is 0.204. Some of the reference values in Eq. (1-2) are not available in the EU Directive. These missing reference values are given below with the assumption of  $\eta_{\tau} = 0.32$ :

- For cooling with *COP* defined equipment *Ref*PER =  $0.32 \cdot 4 = 1.28$
- For cooling with *COP* defined equipment *Ref*PER =  $0.32 \cdot 3 = 0.96$
- For steam generation  $\text{RefS}\eta = 0,75$

It must be noted that in Eq. (1-2) the CHP or TG system may produce more than one energy outputs like cooling, heating, cold air etc. through the use of several heat or power operated machines having *COP* definitions (or *PER*) like a heat pump, absorption chiller etc.

According to EU directive: REfE $\eta$  = 0.52, RefH $\eta$  = 0.90.

Partial efficiencies for heat, power, and cold (based on single-effect absorption chiller) generation of any CHP or TG system will be obtained from manufacturer catalogs or their technical manuals as a function of the load level (like 40 % load, full load, half-load capacity etc.). Hourly calculations of efficiencies will be based on the load percentage of the CHP or TG during that hour on average. If cold or steam is generated from the heat output of the CHP, the CHPHŋ value is decreased accordingly in terms of the

amount of steam and cold generation.

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 $\psi_{RCHP}$  value depends on where different CHP or TG outputs (like power, heat, steam, cold) are allocated in satisfying different building loads and in what cascaded order. Default value is 0.35. This value corresponds to a case where heat output is first used in space heating, then comfort heating with a single stage absorption cooler (COP<sub>c</sub> is 0.6), then satisfying DHW loads and electric power is utilized primarily at useful work points (high exergy) like electric motors, electric machinery, tools etc. and then lighting. However if the exact supply-demand service points are known in a given hourly period the actual value of corresponding to that hourly period must be calculated according to Rational Exergy Management Model (REMM).

Supplementary Heat: If the CHP or TG system receives a fossil fuel based supplementary heat from an external source, the efficiency of that source must be encountered in Eq. (1-3):

(1-3) 
$$PES_{RCHP} = \left[1 - \frac{1}{\left(\frac{\text{CHPH}\eta}{\text{RefH}\eta} + \left\{-\frac{\mathbf{r} \cdot \mathbf{H}_{s}\eta}{\text{RefH}\eta}\right\} + \frac{\text{CHPS}\eta}{\text{RefS}\eta} + \frac{\text{CHPE}\eta}{\text{RefE}\eta} + \sum \frac{PER}{RefPER}\right] \times \frac{(2 - \text{Ref}\psi_{RCHP})}{(2 - \psi_{RCHP})}\right] \times 100$$

Here,

 $H_{sn}$ : First law efficiency of the system which externally provides the supplementary heat.

r : The ratio of supplementary heat to the heat generated by the CHP.

RefH<sub>5</sub>n: Reference efficiency of the supplementary heat generation system (For example for an appropriate system listed in the EU Directive if available).

According to REMM, there are two conditions in evaluating CHP, TG and all other systems whether based on renewable energy sources or not:

Condition I- Exergy destruction takes place prior to useful application in the building (like a heat generating boiler without power generation first). See Figure 1.

Condition II- Exergy is destroyed following the useful application (like a PV module which generates electric power but not hot water afterwards). See Figure 2.

# If Exergy is destroyed before the useful application



Figure 1. The condition when exergy is destroyed first.

Here,  $T_a$  is the DB air temperature, which is based for calculating the exergy demand,  $\varepsilon_{dem}$  of the building for comfort according to the ideal Carnot cycle. In comfort cooling, outdoor air DB temperature is also considered.

(1-4) 
$$\mathcal{E}_{dem} = \left(1 - \frac{T_{ref}}{T_a}\right)$$
 {Heating}

(1-5) 
$$\mathcal{E}_{dem} = \left[ \left( 1 - \frac{T_{ref}}{T_o} \right) - \left( 1 - \frac{T_{ref}}{T_a} \right) \right]$$
 {Cooling}

If Eq. (1-5) yields a negative value, the absolute value may be used.

Unit exergy values on the supply side,  $\varepsilon_{sup}$  are calculated from the equations given below.

(1-6) 
$$\mathcal{E}_{sup} = \left(1 - \frac{T_{ref}}{T_f}\right)$$
 {Heat}  
(1-7) 
$$\mathcal{E}_{sup} = \left[\left(1 - \frac{T_{ref}}{T_o}\right) - \left(1 - \frac{T_{ref}}{T_f}\right)\right]$$
 {Cold}

(1-8a) 
$$\Psi_R = \frac{\mathcal{E}_{dem}}{\mathcal{E}_{sup}}$$

## If exergy is destroyed after the useful application



Figure 2. The condition when the exergy is destroyed after the useful application.

(1-8b) 
$$\Psi_R = 1 - \frac{\mathcal{E}_{dst}}{\mathcal{E}_{sup}}$$

(1-9) 
$$\mathcal{E}_{dst} = \left(1 - \frac{T_{ref}}{T_E}\right) \qquad \{\text{In heating } T_E \ge T_{app}\}$$

If a fossil fuel-based CHP or TG system is hybridized with sustainable energy systems in the building, then the weighted *PES* value must be used:

$$PES_{RA} = PES_{RCHP} + \left(\frac{Q_{AH}\varepsilon_{AH} + Q_{AE}}{Q_{H}\varepsilon_{HH} + Q_{E}}\right) (100 - PE(S_{RD}))$$

Here,  $Q_{AH}$  is the amount of heat/cold (kW-h) supplied from renewable energy resources at a unit exergy value of  $\varepsilon_{AH}$ .  $Q_{AE}$  is the electrical energy supplied from renewable energy resources. Unit exergy of electric power may be defaulted to 1 (a more accurate value is 0.95).  $Q_H$  and  $Q_E$  are the thermal and electrical loads of the building, respectively.  $\varepsilon_{HH}$  is the average unit exergy of the building thermal loads (like space heating and DHW). Then *AER* (Alternative Energy Ratio) becomes a new evaluation metric. For the base reference case  $\psi_R$  is 0.04 for comparison purposes.

(1-11) 
$$AER = \psi_R \times \left(\frac{Q_{AH}\varepsilon_{AH} + Q_{AE}}{Q_H\varepsilon_{HH} + Q_E}\right)$$

One needs to define Carnot Cycle-based equivalent supply temperature for wind and solar energy systems in order to carry out the above calculations. Below,  $\eta_i$  is the wind energy to electrical energy conversion efficiency of a wind turbine.

(1-12) 
$$\frac{I}{1366} = \frac{\left(1 - \frac{T_{ref}}{T_f}\right)}{\left(1 - \frac{T_{ref}}{5800K}\right)}$$

$$(1-13) T_f = \frac{T_{ref}}{(1-\eta_I)}$$

Here, *I* is the solar irradiation intensity on collectors (W/m<sup>2</sup>) where 5800 K is the average surface temperature of the sun. For all applications and equations give above, the reference temperature  $T_{ref}$  may be equated to the average soil temperature like 283 K.

#### Other Sustainable Energy Systems

All above mentioned procedures and algorithm development activities shall also be applied to all sustainable energy systems listed in **Table 1**, **Annex 2**.

#### Building

All performance improvements, economic benefits, and other parameters regarding the building, which may be attributable to sustainable energy systems and renewable energy resources will be evaluated on an hourly basis over a ten-year period. These evaluations will be reported both in brokendown values for each individual system or resource based on annual sums and ten-year grand total values. In order to accomplish these goals the following minimum number of metrics will be used.

- <u>Energy Savings</u>, <u>ENS</u>. Energy savings in kWh units (sum of electrical energy, heat and cold) is calculated on hourly basis. These calculations will be referenced to the Building Electro-Mechanical System Reference Scenario (Annex 6).
- <u>Economic Savings</u>, *ES*. It is calculated based on energy savings. Each type of energy savings (in heat, cold, electrical energy, steam generation terms etc.) over each hourly period will be multiplied by their associated conventional energy or power prices in the market and divided by the corresponding hourly efficiencies of the reference equipment specified in **Annex 6**. If there are more than one power price tariff is applicable for that building during the day (like peak tariff etc.), the power price corresponding to that specific time period will be used. Ten-year fuel cost and power cost projections with at least three prediction models will be carried out. Monthly, yearly and a grand ten-year period sum of economic savings will be reported.
- <u>First Law Efficiency</u>, *n*. This is the ratio of the sum of all energy inputs to the building during a given one-hour period to the all building loads satisfied during that time period. Additionally the first law efficiency of each individual system and equipment are calculated according to the load allocated to them during the same one-hour period (part load, full load etc.: efficiency changes with the level of the system or equipment loading).
- <u>Specific Increase in Initial Investment</u>, *IN*. It is the ratio of the increase in initial investment cost attributable to all sustainable energy systems and renewable energy resources involved in the building to the 10-year grand total economic savings.
- <u>Simple pay-back period in years, Y.</u>
- <u>Rational Exergy Management Efficiency</u>, ψ<sub>R</sub>: If the user has requested the exergy analysis option of the algorithm another additional metric is the *Rational Exergy Management Efficiency* (ψ<sub>R</sub>). Depending upon the type of the application either Eq. (1-8a) or Eq. (1-8b) must be used. If there are a multitude of renewable energy sources/sustainable energy systems or fossil fuel-based conventional systems in the building and each of them share a part of the loads then an average value is calculated:

(1-14) 
$$\overline{\psi}_{R} = \frac{\sum_{i=1}^{d} \sum_{j=1}^{s} \psi_{rij} \times Q_{ij}}{\sum_{i=1}^{d} \sum_{j=1}^{s} Q_{ij}}$$

In the above equation, the subscript *j* represents any load in the building, the subscript *i* represents any energy resource or system.  $Q_{ij}$  is the energy transfer between a supply point *i* and supply point *j*.  $\psi_{Rij}$ is the partial Rational Exergy Management Efficiency between points *i* and *j*. The desired value for Eq. (1-14) is 0.70 or above.

 <u>CO<sub>2</sub> Emission Reduction Ratio</u>, *COR*. This ratio is calculated and shown in annual sums over tenyear period besides broken-down values corresponding to each sustainable energy system and renewable energy resource. CO<sub>2</sub> reduction ratio is based on dividing CO<sub>2</sub> emissions (kg/h) attributable to sustainable energy systems and renewable energy resources during the building operation to the CO<sub>2</sub> emissions attributable to the reference systems prescribed in Annex VI that satisfy the same building loads. On an hourly basis, CO<sub>2</sub> emissions are given by the following equation.

(1-15) 
$$CO_2 = \sum \frac{c_i}{\eta_i} Q_i + \frac{c_j}{\eta_j \eta_T} E_{ex}$$

This value is calculated for all systems and equipment and summed on an hourly basis.

Here:

 $c_i$ : The specific CO<sub>2</sub> emission value of the fossil fuel (if there is any) used by any system or equipment (*i*) during operation in the building (based on lower heating value in kg CO<sub>2</sub>/kWh).

 $Q_i$ : Heat plus electrical energy (if generated) supplied to the building by the equipment (i) (kWh).

 $\eta_i$ : First law efficiency of the equipment (*i*). This is the sum of partial efficiencies for heat and power (if generated).

 $c_j$ : Average specific CO<sub>2</sub> emission value of the conglomerate of the power plants that may externally supply power to the building. In this calculation only the amount of power supplied externally (from the national grid)  $E_{ex}$  is considered.

 $\eta_j \eta_T$ : Average national power generation, transmission and distribution efficiency (0.27).  $E_{ex}$ : Electrical energy supplied from the national grid, kWh

If  $\overline{\psi}_R$  has been calculated the following equation is used:

(1-16) 
$$CO_2 = \sum \frac{c_i}{\eta_i} Q_i (2 - \overline{\psi}_R) + \frac{c_j}{\eta_j \eta_T} E_{ex}$$

# ANNEX II. HIERARCHICAL DATA BASE STRUCTURE

In the Project, all systems whether sustainable or not, whether they use renewable energy resources or not will be defined individually in a hierarchical data base structure. Table 1 shows a sample main system and equipment description data base. This is called the *Main System/Equipment Description Data Base*. The algorithm shall be so prepared that the administration may change, add, and delete equipment and systems. The algorithm must permit three different types and/or capacities from each category.

No	SYSTEM/EQUIPMENT CATEGORY	Address	Quantity/	Address	Quantity/	Address	Quantity/
			Capacity [kW]		Capacity [kW]		Capacity [kW]
1	СНР	11	1/60	12	1/80	13	
2	Heat Pump	21		22		22	
3	Absorption Chiller						
4	Adsorption Chiller						
5	Waste Heat Boiler						
6	PV Module						
7	Flat-Plate Collector						
8	Concentrating solar Collector						
9	PVT (Photo-Voltaic Thermal) Module						
10	PVTC (Photo-Voltaic Thermal and Cooling) Module						
11	PHVT (Photo-Heat Voltaic and Thermal) Module						
12	Biogas Reactor						
13	Wind Turbine						
14	Hot Water Tank						
15	Cold Water Tank						
16	Thermal Storage (Pebble tank, PCM tank labyrinth etc.)						
17	Ice tank						
18	Chiller						
19	Boiler						
20	Steam Generator						
21	Mechanical energy storage (Flywheel, pressure tank etc.)						
22	Electrical Energy Storage (Battery, Flow Battery etc.)						
23	Cooling Tower						
24	Hydraulic Energy Storage						
25	Radiator						
26	TEG (Thermo-electric Generator)						

Table 1. General Format of the Main System/Equipment Description Data Base.

Data	Description	Symbol	Variable(s)
Number			
1	Enter here type and model	Т	
2	Standard Capacity	Ε	kWe
3	Altitude Capacity Factor curve	h	polynomial
	(in 2nd order polynomial		coefficients:
	form)		ho,h1,h2
4	Air Temperature Factor	t	to,t1,t2
5	Humidity Factor	n	n0,n1,n2
6	Air Pressure Factor	р	p0,p1,p2
7	Power to Heat Ratio*	С	co,c1,c2
8	Steam to Power Ratio*	В	bo,b1,b2
9	Exhaust Temperature Curve	TEX	so,s1,s2
10	Cooling Water Temperature	ТС	to,t1,t2
	Curve		
11	Total Efficiency Curve	EFFH	e0, e1,e2
12	Steam Generation Efficiency	EFFS	es0,es1,es2
	Curve		
13	Power Generation Efficiency	VE	vo,v1,v2
	Curve		
14	Cut-off load (percent of the	SI	so,s1,s2
	full load)		

# Table 2. Sample System/Equipment Vectoral Data Base (for CHP engine).

\*Hourly calculated according to the actual load applied (in terms of full load) (Annex 4).

## ANNEX III. ELECTRO-MECHANICAL SYSTEM OPERATON TEMPLATES TO TEST THE ALGORITHM

The entirety of this algorithm to be developed in this Project will be tested by the following electromechanical system operation basic templates that will be applied to the building investigated, based on three different sustainable/efficient energy systems and renewable energy resources (Scenarios 1 to 3 below). In order to accomplish this task, a simple (like Excel program) yet an alpha test program, which includes all algorithmic steps and decision making mechanisms will be developed. In order to test the complete algorithm, the program will be run for three basic templates (scenarios 1 to 3 given below) for the virtual buildings to be defined by the administration in reference to the Building Electro-Mechanical System Base Scenario given in **Annex VI** and all computer analyses will be overviewed. All equations and calculations will be verified for sample days on an hourly basis by hand calculations for typical summer and winter day. I any errors are found, they will be algorithmically corrected and they are reported to the administration.

A copy of the latest alpha test program, all computer results, with hand calculations and their comparisons, and all flow charts will separately be submitted to the administration.

#### Scenario 1

Operation decision making rules are given in Table 1. For the building under consideration only the systems and equipment that apply to that building will be accounted. If there is a CHP system or systems in the building the total nominal power capacity will be assumed to be equal to the peak (annual) power demand multiplied by 0.50.

System	System/Equipment	Decision Making Process
1	Electrical Energy Storage	Is there electrical energy load? Is there more that 20 % energy
	System (Battery, flow battery	stored with respect to the full storage capacity? If both
	etc.)	answers are yes use the storage capacity.
2	Hot Water Tank	Is there hot water/space heating loads? Is there more that 20
		% energy stored with respect to the full storage capacity? If
		both answers are yes use the storage capacity.
3	Combined Heat and Power	Are there coincident electrical and thermal power loads (space
	(CHP)	heating, hot water, steam etc.)? If the answer is yes calculate
		the power to heat load ratio for the corresponding hour of
		operation. How compatible is this ratio with the nominal ratio
		of the CHP system? How much is the difference? If there is
		power generation surplus can it be sold? Can surplus heat may
		be stored in existing tanks at that hour? If the answers are yes
		operate the CHP. Choose the operating load according to the
		largest of heat or power load of the building in that hourly
		period. According to the level of the load calculate the partial
		load (or full load, whichever applicable) efficiency and all
		other performance values of CHP. Assume to utilize the
		thermal output in the sequence of cooling, heating, hot water
		loads. If the electrical energy supply has a deficit, then make it

#### Table 1. Scenario 1

		up from the national grid at the coincident price tariff corresponding to that hour. If the electrical power generation has a surplus, and the thermal loads are not satisfied yet operate the heat pump with the surplus power. If there remains power surplus store it in the available electrical energy storage media. The remaining power may be assumed to be sold back to the grid if permitted during that hour.
4	Heat Pump	Assume that the heat pump will be started if: Thermal storage tanks have less than or equal to 20 % of their full capacity, CHP is operating but thermal loads are not satisfied yet. If PV, PVT, PVTC modules are coincidentally generating power operate the heat pump from the power supplied from them. Make up the deficit from the CHP if it is operating. The remaining power demand will be supplied from the national grid.
5	Absorption Machine	thermal output. If the cooling load and the CHP is operating use its thermal output. If the cooling loads are not satisfied and there is more than 20 % useful capacity in the ice or cold water tanks use the stored cold first. Otherwise, if the temperature in the hot water tank is above 70°C use the thermal energy stored. If the absorption machine provides surplus cold store it in the cold storage media (cold water tank only) if tanks are not full.
6	Adsorption Machine	If the cold demand is not satisfied yet operate the adsorption machine in tandem. Use supplementary heat from the hot water tanks if there is heat available (more than 20 % of the total storage capacity).
7	Boiler	Operate only when all sustainable systems/equipment do not collectively satisfy the total thermal demand of the building.
8	PV Cells	If at the coincident hour, there is solar insolation use or store PV power output first of all.
9	Flat-plate Collectors	If at the coincident hour, there is solar insolation, use or store the thermal output first of all.
10	Concentrating Solar Collectors	If at the coincident hour, there is solar insolation use or store thermal power output first of all.
11	PVT (Photo-Voltaic Thermal)	If at the coincident hour, there is solar insolation use or store both the electrical and thermal power output.
12	PVTC (Photo-Voltaic Thermal and Cooling)	If at the coincident hour, there is solar insolation use or store heat, cold, and electrical power outputs. If there is not any cold demand use the system like PVT (TEG units off).
13	PHVT (Photo-Heat Voltaic and Thermal)	If at the coincident hour, there is solar insolation use or store electrical power. Use the heat for the preheating of the utility water for preparing DHW. If there not any such demand use the system like a PV module.
14	Wind Turbine	If there is sufficient wind power use, store or sell the electrical power.

15	Hot Water Tank	
16	Cold Water Tank	
	Thermal Storage (Pebble	
17	Stones, labyrinth etc.)	
18	Ice Storage Tank	Assume that it will be charge during night time with its dedicated deep chiller.
19	Chillers	If all cooling loads are not satisfied in complete by the sustainable or efficient systems/equipment, then start gas compression chillers. If there exists electrical power supply from sustainable/efficient systems and equipment use these power supplies first. If there is a power deficiency, then make it up from the national grid.
20	Hot Water Boiler	If there is space heating load that is not satisfied use the heat in this tank if the coincident tank temperature is compatible.
21	Steam Generator	If steam demand is not satisfied by the above systems and equipment.

# Scenario 2

Operational priorities and decision making mechanisms are given in Table 2. The top priority in this scenario is the heat pump (There is not any CHP system). The design capacity of the heat pump will be either 70% of the peak (annual) heat load or 60 % of the peak (annual) cooling load, whichever is the highest. It will be assumed that the heat pump shall supply heat or cold to the building comfort system described in **Annex 6**.

# Table 2. Scenario 2

System	System/Equipment	Decision Making Process
1	Heat Pump	
		If not heat available in thermal storage tanks, start heat pump and use renewable power and batteries first
2	Hot Water Storage Tank	Is there hot water/space heating loads? Is there more that 20 % energy stored with respect to the full storage capacity? If both
		answers are yes use the storage capacity.
3	Boiler	
		Operate only when all sustainable systems/equipment do not
		collectively satisfy the total thermal demand of the building.
4	PV Cells	All the systems/equipment below are subject to the same
		decisions given in Table 1.
5	Flat-plate Collectors	
6	Concentrating Solar Collectors	
7	PVT (Photo-Voltaic Thermal)	

8	PVTC (Photo-Voltaic Thermal and	
	Cooling)	
9	PHVT (Photo-Heat Voltaic and	
	Thermal)	
10	Wind Turbine	
11	Cold Water Storage Tank	
	Thermal Storage (Pebble Stones,	
12	labyrinth etc.)	
13	Ice Storage Tank	
14	Chillers	
15	Hot Water Boiler	
16	Steam Generator	
17	Electrical Energy Storage System	
	(Battery, flow battery etc.)	

# Scenario 3

This scenario is identical with Scenario except that the assumed capacity of the CHP system will be 75 % of the peak (annual) power demand of the building.

## ANNEX IV. HOURLY PERFORMANCE SIMULATION AND ANALYSIS ALGORITHM

All relevant variables from the data banks, all information about the corresponding capacities efficiencies, and other performance data of service ready sustainable systems/equipment during a given hourly period are collected and processed in such a manner that processed information and hourly performance details are exhibited and stored in an hourly matrix. Each hour occupies a single horizontal line in that matrix (**see Table 1**). These lines repeat downwards for the number of hours in a day and the number of days in a year and extend to 10 years. So the yearly matrix has 365 x 24 lines. **Table 1** gives a sample matrix for one day (24 hours). Building loads of all applicable types are directly imported from the hourly building loads to be obtained from an external building simulation program. The number of columns depends upon economic analysis, broken down system/equipment performance data, power and fuel price predictions, hourly CO<sub>2</sub> emission responsibility, hourly reduction of CO<sub>2</sub> emissions etc. The final design of the matrix will be carried out by the vendor. In addition, the matrix includes information about electrical energy demand, applicable power tariffs for different hours of a day, thermal storage data and their performance (if there are any).

			COGENERATION CAPACITY =			723.95		kW	
Time	Heating	Heating         Electricity         0.5 (Desired ratio for cogeneration / Peak Load)							
HOUR	HEATING LOAD [kW]	ELECTRICAL LOAD [kW]	Cogeneration Capacity Electricity [kW]	Generated Electricity [kW]	Generated Heat [kW]	Electricity Shortage [kW]	Heating Shortage [kW]	Load	
1:00:00 2:00:00	5012.8467 4117.6267	1029.3946 1029.3946	618.9799 618.2560	618.9799 618.2560	773.724924 772.819982	-410.415 -411.139	-4239.1217 -3344.8067	100% 100%	
3:00:00	4960.8333	1029.3946	617.5320 618.2560	617.5320 618.2560	771.915041	-411.863 -411 139	-4188.9183	100%	
5:00:00	5098.3767	1029.3946	618.2560	618.2560	772.819982	-411.139	-4325.5567	100%	
7:00:00	4772.0633	1029.3946	617.5320	618.2560	771.915041	-411.139 -411.863	-3197.5234 -4000.1483	100%	
8:00:00 9:00:00	4018.8433 4820.8333	989.4090 1397.8587	616.8081 616.8081	616.8081 616.8081	771.010099 771.010099	-372.601 -781.051	-3247.8332 -4049.8232	100% 100%	
10:00:00 11:00:00	5314.9333 4453.5067	1397.6170 1397.3016	616.0841 614.6362	616.0841 614.6362	770.105158 768.295275	-781.533 -782.665	-4544.8282 -3685.2114	100% 100%	
12:00:00 13:00:00	4812.1067 4491 4600	1397.1791 1412 9468	614.6362 613.1883	614.6362 613 1883	768.295275 766 485392	-782.543 -799 758	-4043.8114 -3724 9746	100% 100%	
14:00:00	4799.1367	1397.5811	613.1883	613.1883	766.485392	-784.393	-4032.6513	100%	
16:00:00	4714.9133	1397.8288	613.1883	613.1883	766.485392	-784.782	-3948.4279	100%	
17:00:00 18:00:00	4665.7167 4145.1833	1447.9063 1052.4932	612.4644 612.4644	612.4644 612.4644	765.580451 765.580451	-835.442 -440.029	-3900.1362 -3379.6029	100% 100%	
19:00:00 20:00:00	3973.9033 4010.8267	1029.3946 1029.3946	615.3602 616.8081	615.3602 616.8081	769.200217 771.010099	-414.034 -412.587	-3204.7031 -3239.8166	100% 100%	
21:00:00 22:00:00	4479.6300 3835.0967	1029.3946	615.3602 614 6362	615.3602 614 6362	769.200217	-414.034 -414 758	-3710.4298	100%	
23:00:00	3954.0300	1029.3946	616.0841	616.0841	770.105158	-413.310	-3183.9248	100%	
0.00.00	Peak Load	= 1447.91	015.3002	010.0002	103.200211	-414.034	-4010.0903	10070	

#### Table 1. Sample Hourly Performance Analysis and Evaluation Matrix for a Single Day.

Peak Load = 1447.91 Min Load = 989.41

# ANNEX V. INFORMATION ON LEGISLATIVE BACKGROUND

## BY-LAW ON ENERGY PERFORMANCE OF BUILDINGS (relevant sections)

DEFINITION OF RENEWABLE ENERGY: Renewable energy shall mean non-fossil energy resources such as hydraulic, wind, solar, geothermal, biomass, biogas, wave, current and tidal energy,

#### > PART TEN:

(Amendment of title: Official Journal- 01.04.2010- 27539) Use of renewable energy sources, Heat Pump and Cogeneration Systems

Use of renewable energy sources, heat pump, cogeneration and micro generation systems (Amendment of title: Official Journal- 01.04.2010- 27539)

**ARTICLE 22-** (1) **(Amendment: Official Journal- 01.04.2010- 27539)** In order to meet total or partial energy needs for heating, cooling, ventilation, hot water, electricity and lighting for new buildings with a total useful floor area over 20.000m<sup>2</sup>, system solutions such as use of renewable energy sources, heat pump sourced from soil, air and water, cogeneration and micro generation systems shall be analyzed by designers at designing phase. After analyzing the unit prices published by the Ministry, one or a combination of those applications shall be established in the way that its cost is at least 10% of total cost of the building.

(2) (Abrogated: Official Journal- 01.04.2010- 27539)

(3) (Abrogated: Official Journal- 01.04.2010- 27539)

(4) (Abrogated: Official Journal- 01.04.2010- 27539)

(5) Provisions of standards TS EN 12975-1 and TS 3817 shall be followed in the use of solar energy collectors.

(6) (Abrogated: Official Journal- 01.04.2010- 27539)

(7) (Abrogated: Official Journal- 01.04.2010- 27539)

**Cogeneration Systems** 

ARTICLE 23-(Abrogated: Official Journal- 01.04.2010- 27539)

## > PART THIRTEEN:

## **Annual Energy Need**

**ARTICLE 27** – (1) **(Amendment: Official Journal- 01.04.2010- 27539)** Respective principles and procedures regarding the calculation of annual energy need with heating, cooling, lighting and hot water having priority, are determined by communiqué to be published by the Ministry in official journal.

(2) (Abrogated: Official Journal- 01.04.2010- 27539)

(3) (Abrogated: Official Journal- 01.04.2010- 27539)

(4) (Abrogated: Official Journal- 01.04.2010- 27539)

(5) (Addition: Official Journal- 01.04.2010- 27539) New buildings to have energy certificate cannot have D class, high energy consumption and high  $CO_2$  emissions.
#### ANNEX VI. BUILDING ELECTRO-MECHANICAL SYSTEM BASE SCENARIO

It is essential to calculate, evaluate, and proportion the contributions of sustainable electro-mechanical systems/equipment in the building to economy, environment, and fuel savings and to determine their pay back periods based on a reference electro-mechanical system composed of conventional systems and equipment. In this respect a base electro-mechanical system will be defined. In this base system there will be no any sustainable/efficient system and equipment and no renewable energy input. Instead of these the base system will be composed of natural gas operated condensing boiler, hot water (DHW) boiler (non-condensing type), steam generator, gas compression electric power driven chillers. Default performance values of these systems and equipment are given in the following table. All performance correction factors like altitude, seasonal average outdoor temperature, outdoor pressure, outdoor relative humidity etc. shall be applicable in the algorithm.

System/Equipment	Average Efficiency or COP	Rational Exergy Management	Notes
	,	Efficiency	
Condensing Boiler	0.85	0.08	
Non-Condensing Boiler	0.75	0.06	
Steam Generator	0.75	0.12	Used only for steam based
			applications.
Hot Water Tank and Boiler	0.70	0.05	
Gas Compression, electric	2.5	0.08	Comfort Cooling
Power Driven Chiller			

#### Table 6-1. Base Scenario System Data

The cost of electrical energy will be based on its unit price at that hour or in the day and assumed to be delivered from the national grid; will be selectable according to the building type and applicable daily tariffs. Electrical energy prices will be forecasted for ten years by at least three different models.

Higher Heating Value of Natural Gas (for condensing boiler): 9155 kcal/m<sup>3</sup> Lower Heating Value of Natural Gas (for condensing boiler): 8264 kcal/m<sup>3</sup>

The unit price of natural gas will be converted to per kW-h price instead of m<sup>3</sup> base using data obtained from EPDK. All calculations shall be based on kW-h. The unit price again will be based on the type of the building and its function. Daily minor price fluctuations will not be considered. Yet natural gas prices shall also be forecasted for ten years by at least three different models.

#### ANNEX VII. ESTIMATED MEETINGS AND EXPECTED PARTICIPATION BY TEAM MEMBERS

			Number of	Round	Trip Require	ments for o	ts for each Key Personnel		
Stage No.	Step No.	Phase	Days to be spent required for each participant for meetings	Energy Efficiency and Renewable Energy Expert (Team Leader)	Renewable Energy Expert	Financial Expert	Information System Analysis and Design Expert	Total number of roundtrips required	number of days to be spent
	0	Kick-off meeting	1	1	1	1	1	4	4
	1	Follow-up meeting upon completion of Step 1-Inception Phase	1	1	0	0	0	1	1
I	2	Three interim progress meetings during Step 2–Algorithm Development Phase	1	3	3	1	2	9	9
	2	Follow-up meeting upon completion of Step 2-Algorithm Development Phase	1	1	1	1	1	4	4
	3	Follow-up meeting upon completion of Step 3–Specification of Software Requirements Development Phase	1	1	0	0	1	2	2
	4	Follow-up meeting upon completion of Step 4–Preparation of ToR Phase	1	1	1	1	1	4	4
		TOTAL		8	6	4	6	24	24
	5	Consultancy and Monitoring Services (during tender evaluation process)	2	1	0	0	1	2	4
II	5	Consultancy and Monitoring Services (1 day missions during software development project works)	1	6	6	4	12	28	28
		TOTAL		7	6	4	13	30	32

#### ANNEX VIII. ESTIMATED TIMELINE OF THE ASSIGNMENT (FOR STAGE I AND STAGE II)

STAGE	Step	Phase	Activity	Estimated Timeframes
			Signing of the contract	Day 0
			Kick-off meeting	Day 5
			Submission of Inception Report	Day 20
	1	Inception Phase	Technical and Administrative approval process for the Inception Report	Day 20-40 *
			Submission of Progress Report # 1 for Algorithm Development Phase	Day 70
			Technical and Administrative approval process for the Progress Report # 1	Day 70-90 *
			Submission of Progress Report # 2 for Algorithm Development Phase	Day 120
	-	Algorithm Development	Technical and Administrative approval process for the Progress Report # 2	Day 120-140 *
I	2	Phase	Submission of Progress Report # 3 for Algorithm Development Phase	Day 170
			Technical and Administrative approval process for the Progress Report # 3	Day 170-190 *
			Submission of Final Report for Algorithm Development Phase	Day 225
			Technical and Administrative approval process for the Final Report	Day 225-245 *
		Specification of Software	Submission of Specification of Software Requirements	Day 275
	3	Requirements Development Phase	Technical and Administrative approval process for the Specification of Software Requirements	Day 275-295 *
			Submission of ToR	Day 325
	4         Preparation of ToR         Technical and Administrative approval process for		Technical and Administrative approval process for the ToR	Day 325-345 *
TENDER	R PROC	ESS FOR RET-EAT SOFTWARE	DEVELOPMENT WORKS (UNDERTAKEN BY UNDP)	Day 345-450
			Bid Evaluation Report	Day 450
			Kick-off meeting for RET-EAT software development works	Day 480
			Consultancy and Monitoring Report 1	Day 505
			Technical and Administrative approval process for Report 1	Day 505-520
			Consultancy and Monitoring Report 2	Day 545
			Technical and Administrative approval process for Report 2	Day 545-560
	_	Consultancy and	Consultancy and Monitoring Report 3	Day 585
11	5	Monitoring Services **	Technical and Administrative approval process for Report 3	Day 585-600
			Consultancy and Monitoring Report 4	Day 625
			Technical and Administrative approval process for Report 4	Day 625-640
			Consultancy and Monitoring Report 5	Day 665
			Technical and Administrative approval process for Report 5	Day 665-680
			Consultancy and Monitoring Report 6	Day 705
			Technical and Administrative approval process for Report 6	Day 705-720

\* Please refer to E.1 of Terms of Reference

\*\* Please refer to E.2 of Terms of Reference. The submission dates indicated in this table for Step 5 are based on the successful and timely completion of tender process and the commencement of the software development project works. Therefore the estimated timeframes for Step 5 may shift according to the realization of precedents and the actual provision of services.

Stage Nr.	Step Nr.	Phase	Deliverables	Expert	No of Units (man/day)			
	Step 1	Inception Phase	Inception Report	Energy Efficiency and Renewable Energy Expert (Team Leader)	5			
				Renewable Energy Expert	3			
				Financial Expert	2			
				Information System Analysis and Design Expert	3			
			1	SUB TOTAL - ST	EP 1: 13 man/days			
	Step 2	Algorithm Development	Progress Report # 1 Progress Report # 2	Energy Efficiency and Renewable Energy Expert (Team Leader)	30			
		Phase	Progress Report # 3 Final Report	Renewable Energy Expert	30			
				Financial Expert	20			
				Information System Analysis and Design Expert	20			
Т				SUB TOTAL - STE	P 2: 100 man/days			
	Step 3	Specification of Software		Energy Efficiency and Renewable Energy Expert (Team Leader)	5			
		Requirements Development Phase		Renewable Energy Expert	5			
				Financial Expert	3			
				Information System Analysis and Design Expert	30			
	SUB TOTAL - STEP 3: 43 man/da							
	Step 4	Preparation of ToR Phase	Complete tender dossier	Energy Efficiency and Renewable Energy Expert (Team Leader)	10			
				Renewable Energy Expert	10			
				Financial Expert	5			
				Information System Analysis and Design Expert	10			
				SUB TOTAL - ST	EP 4: 35 man/days			
	Step 5	Consultancy and	Bid Evaluation Report Cons.& Monitoring Report # 1,	Energy Efficiency and Renewable Energy Expert (Team Leader)	8			
		Services	Cons.& Monitoring Report # 2, Cons.& Monitoring Report # 3,	Renewable Energy Expert	6			
П			Cons.& Monitoring Report # 4,	Financial Expert	4			
	Cons.& Monitoring Report # 5, Cons.& Monitoring Report # 6		Cons.& Monitoring Report # 5, Cons.& Monitoring Report # 6	Information System Analysis and Design Expert	14			
	SUB TOTAL - STEP 5: 32 man/							

# ANNEX IX. ESTIMATED NUMBER OF DAYS TO BE INVESTED BY KEY EXPERTS FOR EACH DELIVERABLE

The Offerors shall quote the number of man/days to be invested by each of its personnel in each deliverable with the consideration of the estimations given in this table.

UNDP reserves the right to request further information and/or supporting documentation for quantities which are not in line with these estimations.

### SECTION 5. PROPOSAL SUBMISSION FORM<sup>8</sup>

[insert: Location, Date]

#### To: [insert: Name and Address of UNDP focal point]

#### Dear Sir/Madam:

We, the undersigned, hereby offer to provide professional services for [*insert: title of services*] in accordance with your Request for Proposal dated [*insert: Date*] and our Proposal. We are hereby submitting our Proposal, which includes the Technical Proposal and Financial Proposal sealed under a separate envelope.

We hereby declare that:

- a) All the information and statements made in this Proposal are true and we accept that any misrepresentation contained in it may lead to our disqualification;
- b) We are currently not on the removed or suspended vendor list of the UN or other such lists of other UN agencies, nor are we associated with, any company or individual appearing on the 1267/1989 list of the UN Security Council;
- c) We have no outstanding bankruptcy or pending litigation or any legal action that could impair our operation as a going concern; and
- d) We do not employ, nor anticipate employing, any person who is or was recently employed by the UN or UNDP.

We confirm that we have read, understood and hereby accept the Terms of Reference describing the duties and responsibilities required of us in this RFP, and the General Terms and Conditions of UNDP's Contract for Professional Services.

We agree to abide by this Proposal for [insert: period of validity as indicated in Data Sheet].

We undertake, if our Proposal is accepted, to initiate the services not later than the date indicated in the Data Sheet.

We fully understand and recognize that UNDP is not bound to accept this proposal, that we shall bear all costs associated with its preparation and submission, and that UNDP will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the evaluation.

Yours sincerely,	
Authorized Signature [In full and initials]:	
Name and Title of Signatory:	
Name of Firm:	
Contact Details:	

[please mark this letter with your corporate seal, if available]

 $<sup>^{8}</sup>$  No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.

## SECTION 6. DOCUMENTS ESTABLISHING THE ELIGIBILITY AND QUALIFICATIONS OF THE PROPOSER

## **Proposer Information Form<sup>9</sup>**

Date: [insert date (as day, month and year) of Proposal Submission] RfP No.: [insert number]

Page \_\_\_\_\_ of \_\_\_\_ pages

1. Proposer's Legal Name [insert Proposer's legal name]					
2 In case of laint Venture (IV) legal	name of each party: lincort logal nam	a of each party in 11/1			
2. In case of joint venture (jv), legal	fiame of each party. <i>Insert legal num</i>				
3. Actual or intended Country/ies of Registration/Operation: [insert actual or intended Country of Registration]					
4. Year of Registration: [insert Propo	ser's year of registration]				
5. Countries of Operation	6. No. of staff in each Country	7.Years of Operation in each			
		Country			
8. Legal Address/es in Country/ies o registration]	f Registration/Operation: [insert Propo	oser's legal address in country of			
9. Value and Description of Top three	e (3) Biggest Contract for the past five	(5) years			
10. Latest Credit Rating (if any)					
11. Brief description of litigation his	tory (disputes, arbitration, claims, etc.	), indicating current status and			
outcomes, if already resolved.					
12. Proposer's Authorized Representative Information					
Name: [insert Authorized Representative's name]					
Address: [insert Authorized Representative's Address]					
Telephone/Fax numbers: [insert A	uthorized Representative's telephone,	/fax numbers]			
Email Address: [insert Authorized	Representative's email address]				
13. Are you in the UNPD List 1267.1989 or UN Ineligibility List ? (Y / N)					

<sup>&</sup>lt;sup>9</sup> The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, no alterations to its format shall be permitted and no substitutions shall be accepted.

14. Attached are copies of original documents of:
All eligibility document requirements listed in the Data Sheet
If Joint Venture/Consortium – copy of the Memorandum of Understanding or Letter of Intent to form a
JV/Consortium, or Registration of JV/Consortium, if registered
If case of Government corporation or Government-owned/controlled entity, documents establishing legal
and financial autonomy and compliance with commercial law.

## Joint Venture Partner Information Form (if Registered)<sup>10</sup>

Date: [insert date (as day, month and year) of Proposal Submission] RfP No.: [insert number]

		Page	of	_ pages		
1. Proposer's Legal Name: [insert	Proposer's legal name]					
2. JV's Party legal name: [insert J	/'s Party legal name]					
3. JV's Party Country of Registrat	ion: [insert JV's Party country of reg	istration]				
4. Year of Registration: [insert Party	's year of registration]					
5. Countries of Operation       6. No. of staff in each Country       7.Years of Operation in each Country						
8. Legal Address/es in Country/ies of registration]	8. Legal Address/es in Country/ies of Registration/Operation: [insert Party's legal address in country of registration]					
9. Value and Description of Top thre	e (3) Biggest Contract for the past fi	ve (5) years				
10. Latest Credit Rating (if any)						
<ol> <li>Brief description of litigation h outcomes, if already resolved.</li> </ol>	istory (disputes, arbitration, claims, d	etc.), indicating c	urrent status and			
13. JV's Party Authorized Represer	ntative Information					
Name: [insert name of JV's Party au Address: [insert address of JV's Par Telephone/Fax numbers: [insert ten Email Address: [insert email addres	uthorized representative] ty authorized representative] lephone/fax numbers of JV's Party a s of JV's Party authorized represent	uthorized repres ative]	entative]			
14. Attached are copies of original of	documents of: [check the box(es) of	the attached ori	ginal documents]			
<ul> <li>All eligibility document requirem</li> <li>Articles of Incorporation or Regist</li> </ul>	ents listed in the Data Sheet tration of firm named in 2.					
<ul> <li>In case of government owned en with commercial law.</li> </ul>	tity, documents establishing legal an	d financial auton	omy and compliand	ce		

<sup>&</sup>lt;sup>10</sup> The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, No alterations to its format shall be permitted and no substitutions shall be accepted.

### SECTION 7. TECHNICAL PROPOSAL FORM

#### **TECHNICAL PROPOSAL FORMAT**

#### **INSERT TITLE OF THE SERVICES**

Note: Technical Proposals not submitted in this format may be rejected. The financial proposal should be included in separate envelope.

Name of Proposing Organization / Firm:	
Country of Registration:	
Name of Contact Person for this Proposal:	
Address:	
Phone / Fax:	
Email:	

#### SECTION 1: EXPERTISE OF FIRM/ ORGANISATION

**Sub-Section 1.1: Organizational Capacity:** This section should provide corporate orientation, including but not limited to the year and state/country of incorporation and a brief description of the Offeror's activities. It should focus on services related to the Proposal. Offeror should attach company Profile, which should not exceed ten (10) pages, including printed brochures.

- **1.1.1 General Experience:** A brief description of corporate background and orientation with a focus on relevant experience and services delivered to multinational and international organizations.
- **1.1.2 Specialization:** This section should focus on the Offeror's scope of specialization with an emphasis on ongoing/present or recently completed activities.
- **1.2.3 Financial Strength:** This section should describe Offeror's current financial capabilities. Offeror shall provide 2013 Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report, if applicable or 2013 financial statement (Income Statement and Balance Sheet) certified by a public accountant.

#### Sub-Section 1.2: Relevance:

- **1.2.1 Experience on Similar Programme / Projects:** This section should initially provide a narrative presentation of the Offeror's experience in similar undertakings, preferably focusing on the Offeror's recent activities
- **1.2.2** Experience on Projects in the Region/Country (Turkey): This section should provide a summary of the Offeror's experience in similar undertakings in the region/country (Turkey).

#### SECTION 2 - PROPOSED METHODOLOGY, APPROACH AND IMPLEMENTATION PLAN

This section should demonstrate the Offeror's responsiveness to the Terms of Reference by identifying the specific components proposed, addressing the requirements, as specified, point by point; providing a detailed description of the essential performance characteristics, proposed warranty; and demonstrating how the proposed methodology meets or exceeds the Terms of Reference (Section 2 of Technical Proposal Form should not exceed 10 pages, excluding the forms in the relevant section of this RfP).

**Sub-section 2.1: Proposed Methodology and Approach:** This section should focus on the (a) comments on the Terms of Reference; (b) the Technical Approach and Methodology; proposed by the Offeror; (c) Quality Assurance Mechanisms to be deployed; and Risks, identified, along with proposed risk mitigation strategies.

- **2.1.1 Comments on the Terms of Reference:** The Offeror shall initially provide a description of the scope of the work, demonstrating the Offeror's understanding of the Terms of Reference. Additionally, the Offeror shall present and justify here any improvement to the Terms of Reference it is proposing to improve performance in carrying out the assignment. Such suggestions should be concise and to the point, and incorporated in your Proposal.
- **2.1.2 Technical Approach and Methodology:** Here the Offeror shall explain its understanding of the objectives of the assignment, approach to the services, methodology for carrying out the activities and obtaining the expected output, and the degree of detail of such output. Offeror should highlight the problems being addressed and their importance, and explain the technical approach it would adopt to address them. Offeror should also explain the methodologies it proposes to adopt and highlight the compatibility of those methodologies with the proposed approach.
- **2.1.3 Quality Assurance and Risks**: This sub-section should focus on the quality assurance mechanism to be proposed by the Offeror and risks to be identified by the Offeror, along with proposed risk mitigation strategies and measures.

**Sub-section 2.2: Implementation Plan:** In this sub-section the Offeror should propose the main activities of the Assignment, their content and duration, phasing and interrelations, milestones, and delivery dates of the reports, calculations, drawings, technical specifications, bills of quantities, any other technical documents regarding the Terms of Reference, tendering documents and any other deliverable regarding the successful and timely completion of the Assignment. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the Terms of Reference and ability to translate them into a feasible working plan. A list of the final documents, including reports, drawings and tables to be delivered as final output, should be included here.

- **2.2.1 Work Flow**: Here the Offerors are expected to provide a logically sequenced, step-by-step work flow that demonstrates the inter-dependencies between the various steps of the Assignment in line with the ToR.
- **2.2.2 Milestones:** This sub-section should clearly identify and list the critical milestones of the Assignment.
- **2.2.3 Time plan:** The Offerors are expected to present a time plan in the form of <u>Gantt-Chart</u> (Form 2.2.3), consistent with sub-section 2.2.1 and sub-section 2.2.2, and in line with the ToR.
- **2.2.4 Resource Schedule**: This sub-section should demonstrate the resources (human resources and capital assets), required to be deployed by the Offeror in order to achieve the contract objectives in a timely manner. Here the Offerors are expected to fully explain their resources in terms of equipment (e.g. hardware and software) to be provided for successful completion of the Contract.

#### **SECTION 3: PERSONNEL**

This section should fully explain the Offeror's resources in terms of personnel and facilities necessary for the performance of this requirement. It should describe the Offeror's current capabilities/facilities and any plans for their expansion.

**Sub-section 3.1 Proposed Team Structure:** This sub-section should introduce the team that will fulfill the services within the scope of the Terms of Reference, and focus on the division of labor among the team members (job descriptions of key personnel), including management of contractual and technical relations with the Employers.

The Offeror is required to fill the below table in accordance with the estimations given in Annex IX of Section 4. Any deviation between the proposed and the estimated number of man/days shall be clearly defined. UNDP reserves the right to request further clarification / supporting documentation during the assessment of the deviation. The number of man/days indicated in this table shall be the same with the ones that will be indicated in Section 8. Financial Proposal. Any deviation may lead to disqualification.

Stage Nr.	Step Nr.	Phase	Deliverables	Expert	No of Units (man/day)
	Step 1	Inception Phase	Inception Report	Energy Efficiency and Renewable Energy Expert (Team Leader)	
				Renewable Energy Expert	
				Financial Expert	
				Information System Analysis and Design Expert	
			ſ	SU	B TOTAL - STEP 1:
	Step 2	Algorithm Development	Progress Report # 1 Progress Report # 2	Energy Efficiency and Renewable Energy Expert (Team Leader)	
		Phase	Progress Report # 3 Final Report	Renewable Energy Expert	
				Financial Expert	
				Information System Analysis and Design Expert	
I		-		SU	B TOTAL - STEP 2:
	Step 3	Specification of Software Requirements Development Phase		Energy Efficiency and Renewable Energy Expert (Team Leader)	
				Renewable Energy Expert	
				Financial Expert	
				Information System Analysis and Design Expert	
		-		SU	B TOTAL - STEP 3:
	Step 4	Preparation of ToR Phase	Complete tender dossier	Energy Efficiency and Renewable Energy Expert (Team Leader)	
				Renewable Energy Expert	
				Financial Expert	
				Information System Analysis and Design Expert	
		•	•	SU	B TOTAL - STEP 4:

#### NUMBER OF DAYS TO BE INVESTED BY KEY EXPERTS FOR EACH DELIVERABLE

П	Step 5	Consultancy and	d Bid Evaluation Report Er Cons.& Monitoring Report # 1, Er	Energy Efficiency and Renewable Energy Expert (Team Leader)		
			Monitoring Services	Cons.& Monitoring Report # 2, Cons.& Monitoring Report # 3, Cons.& Monitoring Report # 4, Fin	Renewable Energy Expert	
	П				Financial Expert	
		Cons.& Monitoring Report # 5, Cons.& Monitoring Report # 6	Information System Analysis and Design Expert			
					SUI	B TOTAL - STEP 5:

**Sub-section 3.2 Key Personnel:** Provide CVs of the proposed key personnel, and copies of the diploma(s), documents demonstrating professional experience, and documents demonstrating membership to relevant chambers of the team members.

In case an Offeror plans to engage additional personnel to this assignment, it will provide detailed description of works to be performed by these additional personnel and their working relations with the key personnel.

CVs should demonstrate qualifications in areas relevant to the Scope of Services. Please use the format below:

Name:			
Position for this Contract:			
Nationality:			
Contact information:			
Countries of Work Experience:			
Language Skills:			
Educational and other Qualificati	ons:		
Summary of Experience: Highli	ght experience	in the region and on simila	r projects.
Relevant Experience (From most	recent):		
Period: From – To	Name of acti	ivity/ Project/ funding	Job Title and Activities
	organisation	, if applicable:	undertaken/Description of
			actual role performed:
e.g. June 2004-January 2005			
Etc.			
Etc.			
Reference no.1 (minimum of 3)	Name		
	Designation		
	Organization	1	
	Contact Infor	rmation – Address; Phone; E	Email; etc.
Reference no.2	Name		
	Designation		
	Organization	1	
	Contact Infor	rmation – Address; Phone; E	Email; etc.
Reference no.3	Name		
	Designation		
	Organization	1	
	Contact Infor	rmation – Address; Phone; E	Email; etc.

Declaration:

I confirm my intention to serve in the stated position and present availability to serve for the term of the proposed contract. I also understand that any wilful misstatement described above may lead to my disqualification, before or during my engagement.

Signature of the Nominated Team Leader/Member

Date Signed

The operational and technical part of the Proposal should <u>not</u> contain any pricing information whatsoever on the services offered. Pricing information shall be separated and only contained in the appropriate Price Schedules.

**Offeror's Proposal numbering system shall correspond with the numbering system used above.** All references to descriptive material and brochures should be included in the appropriate response paragraph, though material/documents themselves may be provided as annexes to the Proposal/response.

Information which the Offeror considers proprietary, if any, should be dearly marked "proprietary" next to the relevant part of the text and it will then be treated as such accordingly.

## SECTION 8. FINANCIAL PROPOSAL FORM<sup>11</sup>

The Proposer is required to prepare the Financial Proposal in an envelope separate from the rest of the RfP as indicated in the Instruction to Proposers.

The Financial Proposal must provide a detailed cost breakdown. Provide separate figures for each functional grouping or category.

UN and its subsidiary organs are exempt from all taxes. Therefore Offerors shall prepare their Financial Proposals, excluding VAT. It is the Offeror's responsibility to learn from relevant authorities (Ministry of Finance) and/or to review/confirm published procedures and to consult with a certified financial consultant as needed, to confirm the scope and procedures of VAT exemption application as per VAT Law and Ministry of Finance's Communiqués.

Any estimates for cost-reimbursable items, such as travel and out-of-pocket expenses, should be listed separately.

In case of an equipment component to the service provider, the Price Schedule should include figures for both purchase and lease/rent options. UNDP reserves the option to either lease/rent or purchase outright the equipment through the Contractor.

The format shown on the following pages is a requirement for the preparation of the Financial Proposal. Any deviation from this format may result in disqualification of the Offeror.

The Offerors shall quote the number of man/days to be invested by each of its personnel in each deliverable and the quantities for other items with the consideration of the estimations given in tables under Annex 7 and 9 of Section 4 Terms of Reference.

UNDP reserves the right to request further information and/or supporting documentation for quantities which are not in line with these estimations.

The payments will be made on lump sum basis for the deliverables specified in Stage I upon the completion of necessary approval steps described under Section 4, E. Institutional Arrangement.

For Stage II, the payments will be based on the actual man/days spent for the completion of the respective deliverables specified under Stage II. The contractor will be requested to submit timesheets along with the specified deliverable for the approval of UNDP under Stage II.

UNDP will request 32 man/days<sup>12</sup> of services from the Contractor, as and when needed. The indicative figure of 32 working days of the relevant expert(s) for consultancy and monitoring services (Stage II) might also vary per request basis of the Employer depending on the progress of RET-EAT software development tender process and RET-EAT software development works, (see "Section 4 Terms of Reference"). The daily rate per working day of the expert(s) or other terms and conditions which specified in the RfP shall not be subject to any change in that case.

<sup>&</sup>lt;sup>11</sup> No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.

<sup>&</sup>lt;sup>12</sup> Please refer to Annex VII of Section 4.

Stage Nr.	Step Nr.	Phase	Deliverables <sup>13</sup>	Unit Name	No of Units 14,15.16	Unit Price (USD) <sup>17</sup>	Total Price (USD)
	Step 1	Inception Phase	Inception Report	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Financial Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in one separate row)			
				Accommodation			
				Other (Please specify main expenses)			
		-	SUB	TOTAL - STEP 1			
	Step 2	Algorithm Development	Progress Report # 1	Energy Efficiency and Renewable Energy Expert (Team Leader)			
		Phase	Progress Report # 2 Progress Report # 3	Renewable Energy Expert			
				Financial Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in one separate row)			
			Final Report	Accommodation			
				Other (Please specify main expenses)			
	SUB TOTAL - STEP 2						
	Step 3	Specification of Software Requirements Development Phase	Specification ofSoftware ArchitecturalSoftwareRequirements Report	Energy Efficiency and Renewable Energy Expert (Team Leader)			
			irements lopment e Software Requirement Specifications System Sustainability Specification Report	Renewable Energy Expert			
				Financial Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in one separate row)			
				Accommodation			
				Other (Please specify main expenses)			
	SUB TOTAL - STEP 3						
	Step 4	94 Preparation of ToR Phase	Paration of Complete tender dossier R Phase	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Financial Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in			
				one separate row)			
				Accommodation Other (Please specify main expenses)			
		1	1	Other (Flease specify filant expenses)	SUB	TOTAL - STEP 4	

#### TABLE 8.1 - PRICE SCHEDULE FOR STAGE I (INCEPTION, ALGORITHM DEVELOPMENT, SRS AND TOR):

<sup>&</sup>lt;sup>13</sup> The Contractor shall not be entitled to any payments relating to any Step, unless the deliverables linked to that Step are submitted to UNDP on time and in full compliance with the Terms of Reference given in Section 4, and approved by UNDP.

<sup>&</sup>lt;sup>14</sup> The Offerors shall quote the number of man/days to be invested by each of its personnel in each deliverable and the quantities for other items with the consideration of the estimations given in tables under Annex 7 and 9 of Section 4 Terms of Reference.

<sup>&</sup>lt;sup>15</sup> The transportation, accommodation and other expenses of Contractor's personnel to be incurred in relation to meetings throughout Steps 1-4 shall be included in the Price Proposal.

<sup>&</sup>lt;sup>16</sup> The number of man/days indicated in this table shall be the same with the ones proposed in the table given in sub section 3.1 Proposed Team Structure of Section 7. Technical Proposal Form. Any deviation may lead to disqualification.

<sup>&</sup>lt;sup>17</sup> The unit prices specified in the above table shall be in line with the rates specified in Table 8.4 of Section 8.

Stage Nr.	Step Nr.	Phase	Deliverables <sup>18</sup>	Unit Name	No of Units 19,20, 21	Unit Price (USD) <sup>22</sup>	Total Price (USD)
	Step 5	Consultancy & Monitoring Services	<ul><li>Bid Evaluation Report</li><li>Consultancy and Monitoring</li></ul>	Energy Efficiency and Renewable Energy Expert (Team Leader)			
II			<ul> <li>Report 1</li> <li>Consultancy and Monitoring</li> </ul>	Renewable Energy Expert Financial Expert			
			Report 2 - Consultancy and Monitoring	Information System Analysis and Design Expert			
			Report 3 - Consultancy and Monitoring Report 4	Travel (Please specify the route for each trip in one separate row)			
			- Consultancy and Monitoring	Accommodation			
			Report 5 - Consultancy and Monitoring Report 6	Other (Please specify main expenses)			
	SUB TOTAL - STEP 5						

### TABLE 8.2 - PRICE SCHEDULE FOR STAGE II (CONSULTANCY & MONITORING SERVICES):

The Offerors shall reflect in detail the cost items such as Administrative, Human Resources, Operational, etc. costs in "Other" line. UNDP reserves the right to request further clarification and/or supporting documentation for these items as well as the right to exclude these items from contract to be signed based on the assessment of the necessity of these cost items for performance of the contract.

Signature Duly authorized to sign Quotation for and on behalf of

(Name of Company)

Signature/Stamp of Entity/Date Name of representative: Address: Telephone/Fax: Email:

<sup>&</sup>lt;sup>18</sup> The Contractor shall not be entitled to any payments relating to any Activity, unless the deliverables linked to that Activity are submitted to UNDP on time and in full compliance with the Terms of Reference given in Section 4, and approved by UNDP.

<sup>&</sup>lt;sup>19</sup> The Offerors shall quote the number of man/days to be invested by each of its personnel in each deliverable and the quantities for other items with the consideration of the estimations given in tables under Annex 7 and 9 of Section 4 Terms of Reference.

<sup>&</sup>lt;sup>20</sup> The transportation, accommodation and other expenses of Contractor's personnel to be incurred in relation to meetings in Step 5 shall be included in the Price Proposal.

<sup>&</sup>lt;sup>21</sup> The number of man/days indicated in this table shall be the same with the ones proposed in the table given in sub section 3.1 Proposed Team Structure of Section 7. Technical Proposal Form. Any deviation may lead to disqualification.

<sup>&</sup>lt;sup>22</sup> The unit prices specified in the above table shall be in line with the rates specified in Table 8.4 of Section 8.

#### TABLE 8.3 – GRAND TOTAL PRICE

DESCRIPTION	TOTAL PRICE
Services for Stage I (Inception, Algorithm Development, SRS and ToR) (Lump Sum)	
Services for Stage II (Consultancy and Monitoring Services) (Unit Price Based)	
GRAND TOTAL:	

"GRAND TOTAL" to be quoted by the Offerors shall be the basis of Financial Evaluation.

Signature Duly authorized to sign Quotation for and on behalf of

(Name of Company)

Signature/Stamp of Entity/Date Name of representative: Address: Telephone/Fax: Email:

#### TABLE 8.4: UNIT PRICES FOR COST ITEMS:

Stage Number	Step Number	Description of Item	Unit Price (USD/day)
	Step 1-4	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 1-4	Renewable Energy Expert	
	Step 1-4	Financial Expert	
	Step 1-4	Information System Analysis and Design Expert	
I	Step 1-4	Non-key Experts (add rows as necessary)	
	Step 1-4	Travel for Key Personnel (Please specify the route for each trip in one separate row)	
	Step 1-4	Accommodation Expenses of Key Personnel	
	Step 1-4	Other (Please specify main expenses)	
	Step 5	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 5	Renewable Energy Expert	
	Step 5	Financial Expert	
	Step 5	Information System Analysis and Design Expert	
	Step 5	Non-key Experts (add rows as necessary)	
	Step 5	Travel for Key Personnel (Please specify the route for each trip in one separate row)	
	Step 5	Accommodation Expenses of Key Personnel	

Signature Duly authorized to sign Quotation for and on behalf of

(Name of Company)

Signature/Stamp of Entity/Date Name of representative: Address: Telephone/Fax: Email:

### SECTION 9. CONTRACT FOR PROFESSIONAL SERVICES

#### THIS IS UNDP'S TEMPLATE FOR CONTRACT FOR THE PROPOSER'S REFERENCE. ADHERENCE TO ALL TERMS AND CONDITIONS IS MANDATORY.

Date \_\_\_\_\_

Dear Sir/Madam,

#### Ref.: \_\_\_\_/ \_\_\_\_ [INSERT PROJECT NUMBER AND TITLE OR OTHER REFERENCE]

The United Nations Development Programme (hereinafter referred to as "UNDP"), wishes to engage your [company/organization/institution], duly incorporated under the Laws of \_\_\_\_\_\_ [INSERT NAME OF THE COUNTRY] (hereinafter referred to as the "Contractor") in order to perform services in respect of \_\_\_\_\_\_ [INSERT SUMMARY DESCRIPTION OF THE SERVICES] (hereinafter referred to as the "Services"), in accordance with the following Contract:

- 1. <u>Contract Documents</u>
- 1.1 This Contract is subject to the UNDP General Conditions for Professional Services attached hereto as Annex I. The provisions of such Annex shall control the interpretation of this Contract and in no way shall be deemed to have been derogated by the contents of this letter and any other Annexes, unless otherwise expressly stated under section 4 of this letter, entitled "Special Conditions".
- 1.2 The Contractor and UNDP also agree to be bound by the provisions contained in the following documents, which shall take precedence over one another in case of conflict in the following order:
  - a) this Letter;

b) the Terms of Reference [ref. .....dated......], attached hereto as Annex II;

c) the Contractor's Proposal [ref....., dated ......]d) The UNDP Request for Proposal [ref....., dated.....]

- 1.3 All the above shall form the Contract between the Contractor and UNDP, superseding the contents of any other negotiations and/or agreements, whether oral or in writing, pertaining to the subject of this Contract.
- 2. <u>Obligations of the Contractor</u>
- 2.1 The Contractor shall perform and complete the Services described in Annex II with due diligence and efficiency and in accordance with the Contract.
- 2.2 The Contractor shall provide the services of the following key personnel:

Name Specialization Nationality Period of service

.... ......

- 2.3 Any changes in the above key personnel shall require prior written approval of **[NAME and TITLE],** UNDP.
- 2.4 The Contractor shall also provide all technical and administrative support needed in order to ensure the timely and satisfactory performance of the Services.
- 2.5 The Contractor shall submit to UNDP the deliverables specified hereunder according to the following schedule:

[LIST DELIVERABLES]	[INDICATE DELIVERY DATES]
e.g.	
Progress report  Final report	// // //

- 2.6 All reports shall be written in the English language, and shall describe in detail the services rendered under the Contract during the period of time covered in such report. All reports shall be transmitted by the Contractor by \_\_\_\_\_ [MAIL, COURIER AND/OR FAX] to the address specified in 9.1 below.
- 2.7 The Contractor represents and warrants the accuracy of any information or data provided to UNDP for the purpose of entering into this Contract, as well as the quality of the deliverables and reports foreseen under this Contract in accordance with the highest industry and professional standards.

#### 3. <u>Price and Payment</u>

- 3.1 In full consideration for the complete and satisfactory performance of the Services under this Contract, UNDP shall pay the Contractor a fixed contract price of \_\_\_\_\_ [INSERT CURRENCY & AMOUNT IN FIGURES AND WORDS].
- 3.2 The price of this Contract is not subject to any adjustment or revision because of price or currency fluctuations or the actual costs incurred by the Contractor in the performance of the Contract.
- 3.3 Payments effected by UNDP to the Contractor shall be deemed neither to relieve the Contractor of its obligations under this Contract nor as acceptance by UNDP of the Contractor's performance of the Services.
- 3.4 UNDP shall effect payments to the Contractor after acceptance by UNDP of the invoices submitted by the Contractor to the address specified in 9.1 below, upon achievement of the corresponding milestones and for the following amounts:

MILESTONE

AMOUNT

#### TARGET DATE

Upon.... ../../.... .....

Invoices shall indicate the milestones achieved and corresponding amount payable.

#### 4. Special conditions

.....

- 4.1 The responsibility for the safety and security of the Contractor and its personnel and property, and of UNDP's property in the Contractor's custody, rests with the Contractor.
- 4.2
- 4.3
- 4.4
- 5. Submission of invoices
- 5.1 An original invoice shall be submitted by mail by the Contractor for each payment under the Contract to the following address:
  - .....
- 5.2 Invoices submitted by fax shall not be accepted by UNDP.
- 6. Time and manner of payment
- 6.1 Invoices shall be paid within thirty (30) days of the date of their acceptance by UNDP. UNDP shall make every effort to accept an invoice or so advise the Contractor of its non-acceptance within a reasonable time from receipt.
- 6.2 All payments shall be made by UNDP to the following Bank account of the Contractor:

\_\_\_\_\_ [NAME OF THE BANK]

[ACCOUNT NUMBER]

\_\_\_\_\_ [ADDRESS OF THE BANK]

- 7. Entry into force. Time limits.
- 7.1 The Contract shall enter into force upon its signature by both parties.
- The Contractor shall commence the performance of the Services not later than [INSERT DATE] and 7.2 shall complete the Services within \_\_\_\_\_\_ [INSERT NUMBER OF DAYS OR MONTHS] of such commencement.
- All time limits contained in this Contract shall be deemed to be of the essence in respect of the performance 7.3 of the Services.

#### 8. <u>Modifications</u>

8.1 Any modification to this Contract shall require an amendment in writing between both parties duly signed by the authorized representative of the Contractor and \_\_\_\_\_ [NAME AND TITLE] UNDP.

#### 9. <u>Notifications</u>

For the purpose of notifications under the Contract, the addresses of UNDP and the Contractor are as follows:

#### For the UNDP:

Name Designation Address Tel. No. Fax. No. Email address:

#### For the Contractor:

Name Designation Address Tel. No. Fax. No. Email address:

If the above terms and conditions meet with your agreement as they are typed in this letter and in the Contract Documents, please initial every page of this letter and its attachments and return to this office one original of this Contract, duly signed and dated.

Yours sincerely,

#### [INSERT NAME AND DESIGNATION]

#### For [INSERT NAME OF THE COMPANY/ORGANIZATION]

Agreed and Accepted:

Signature _		
Name:	 	
Title:	 	_
Date:	 	



#### UNDP GENERAL CONDITIONS OF CONTRACT FOR SERVICES

#### 1.0 LEGAL STATUS:

The Contractor shall be considered as having the legal status of an independent contractor vis-à-vis the United Nations Development Programme (UNDP). The Contractor's personnel and sub-contractors shall not be considered in any respect as being the employees or agents of UNDP or the United Nations.

#### 2.0 SOURCE OF INSTRUCTIONS:

The Contractor shall neither seek nor accept instructions from any authority external to UNDP in connection with the performance of its services under this Contract. The Contractor shall refrain from any action that may adversely affect UNDP or the United Nations and shall fulfill its commitments with the fullest regard to the interests of UNDP.

#### 3.0 CONTRACTOR'S RESPONSIBILITY FOR EMPLOYEES:

The Contractor shall be responsible for the professional and technical competence of its employees and will select, for work under this Contract, reliable individuals who will perform effectively in the implementation of this Contract, respect the local customs, and conform to a high standard of moral and ethical conduct.

#### 4.0 ASSIGNMENT:

The Contractor shall not assign, transfer, pledge or make other disposition of this Contract or any part thereof, or any of the Contractor's rights, claims or obligations under this Contract except with the prior written consent of UNDP.

#### 5.0 SUB-CONTRACTING:

In the event the Contractor requires the services of sub-contractors, the Contractor shall obtain the prior written approval and clearance of UNDP for all sub-contractors. The approval of UNDP of a sub-contractor shall not relieve the Contractor of any of its obligations under this Contract. The terms of any sub-contract shall be subject to and conform to the provisions of this Contract.

#### 6.0 OFFICIALS NOT TO BENEFIT:

The Contractor warrants that no official of UNDP or the United Nations has received or will be offered by the Contractor any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of an essential term of this Contract.

#### 7.0 INDEMNIFICATION:

The Contractor shall indemnify, hold and save harmless, and defend, at its own expense, UNDP, its officials, agents, servants and employees from and against all suits, claims, demands, and liability of any nature or kind, including their costs and expenses, arising out of acts or omissions of the Contractor, or the Contractor's employees, officers, agents or sub-contractors, in the performance of this Contract. This provision shall extend, inter alia, to claims and liability in the nature of workmen's compensation, products liability and liability arising out of the use of patented inventions or devices, copyrighted material or other intellectual property by the Contractor, its employees, officers, agents, servants or sub-contractors. The obligations under this Article do not lapse upon termination of this Contract.

#### 8.0 INSURANCE AND LIABILITIES TO THIRD PARTIES:

**8.1** The Contractor shall provide and thereafter maintain insurance against all risks in respect of its property and any equipment used for the execution of this Contract.

**8.2** The Contractor shall provide and thereafter maintain all appropriate workmen's compensation insurance, or the equivalent, with respect to its employees to cover claims for personal injury or death in connection with this Contract.

**8.3** The Contractor shall also provide and thereafter maintain liability insurance in an adequate amount to cover third party claims for death or bodily injury, or loss of or damage to property, arising from or in connection with the provision of services under this Contract or the operation of any vehicles, boats, airplanes or other equipment owned or leased by the Contractor or its agents, servants, employees or sub-contractors performing work or services in connection with this Contract.

8.4 Except for the workmen's compensation insurance, the insurance policies under this Article shall:

8.4.1 Name UNDP as additional insured;

**8.4.2** Include a waiver of subrogation of the Contractor's rights to the insurance carrier against the UNDP;

**8.4.3** Provide that the UNDP shall receive thirty (30) days written notice from the insurers prior to any cancellation or change of coverage.

**8.5** The Contractor shall, upon request, provide the UNDP with satisfactory evidence of the insurance required under this Article.

#### 9.0 ENCUMBRANCES/LIENS:

The Contractor shall not cause or permit any lien, attachment or other encumbrance by any person to be placed on file or to remain on file in any public office or on file with the UNDP against any monies due or to become due for any work done or materials furnished under this Contract, or by reason of any other claim or demand against the Contractor.

**10.0 TITLE TO EQUIPMENT:** Title to any equipment and supplies that may be furnished by UNDP shall rest with UNDP and any such equipment shall be returned to UNDP at the conclusion of this Contract or when no longer needed by the Contractor. Such equipment, when returned to UNDP, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear. The Contractor shall be liable to compensate UNDP for equipment determined to be damaged or degraded beyond normal wear and tear.

#### 11.0 COPYRIGHT, PATENTS AND OTHER PROPRIETARY RIGHTS:

**11.1** Except as is otherwise expressly provided in writing in the Contract, the UNDP shall be entitled to all intellectual property and other proprietary rights including, but not limited to, patents, copyrights, and trademarks, with regard to products, processes, inventions, ideas, know-how, or documents and other materials which the Contractor has developed for the UNDP under the Contract and which bear a direct relation to or are produced or prepared or collected in consequence of, or during the course of, the performance of the Contract, and the Contractor acknowledges and agrees that such products, documents and other materials constitute works made for hire for the UNDP.

**11.2** To the extent that any such intellectual property or other proprietary rights consist of any intellectual property or other proprietary rights of the Contractor: (i) that pre-existed the performance by the Contractor of its obligations under the Contract, or (ii) that the Contractor may develop or acquire, or may have developed or acquired, independently of the performance of its obligations under the Contract, the UNDP does not and shall not claim any ownership interest thereto, and the Contractor grants to the UNDP a perpetual license to use such intellectual property or other proprietary right solely for the purposes of and in accordance with the requirements of the Contract.

**11.3** At the request of the UNDP; the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring or licensing them to the UNDP in compliance with the requirements of the applicable law and of the Contract.

**11.4** Subject to the foregoing provisions, all maps, drawings, photographs, mosaics, plans, reports, estimates, recommendations, documents, and all other data compiled by or received by the Contractor under the Contract shall be the property of the UNDP, shall be made available for use or inspection by the UNDP at reasonable times and in reasonable places, shall be treated as confidential, and shall be delivered only to UNDP authorized officials on completion of work under the Contract.

#### 12.0 USE OF NAME, EMBLEM OR OFFICIAL SEAL OF UNDP OR THE UNITED NATIONS:

The Contractor shall not advertise or otherwise make public the fact that it is a Contractor with UNDP, nor shall the Contractor, in any manner whatsoever use the name, emblem or official seal of UNDP or THE United Nations, or any abbreviation of the name of UNDP or United Nations in connection with its business or otherwise.

#### 13.0 CONFIDENTIAL NATURE OF DOCUMENTS AND INFORMATION:

Information and data that is considered proprietary by either Party, and that is delivered or disclosed by one Party ("Discloser") to the other Party ("Recipient") during the course of performance of the Contract, and that is designated as confidential ("Information"), shall be held in confidence by that Party and shall be handled as follows:

**13.1** The recipient ("Recipient") of such information shall:

**13.1.1** use the same care and discretion to avoid disclosure, publication or dissemination of the Discloser's Information as it uses with its own similar information that it does not wish to disclose, publish or disseminate; and,

**13.1.2** use the Discloser's Information solely for the purpose for which it was disclosed.

**13.2** Provided that the Recipient has a written agreement with the following persons or entities requiring them to treat the Information confidential in accordance with the Contract and this Article 13, the Recipient may disclose Information to:

**13.2.1** any other party with the Discloser's prior written consent; and,

**13.2.2** the Recipient's employees, officials, representatives and agents who have a need to know such Information for purposes of performing obligations under the Contract, and employees officials, representatives and agents of any legal entity that it controls, controls it, or with which it is under common control, who have a need to know such Information for purposes of performing obligations under the Contract, provided that, for these purposes a controlled legal entity means:

**13.2.2.1** a corporate entity in which the Party owns or otherwise controls, whether directly or indirectly, over fifty percent (50%) of voting shares thereof; or,

**13.2.2.2** any entity over which the Party exercises effective managerial control; or,

**13.2.2.3** for the UNDP, an affiliated Fund such as UNCDF, UNIFEM and UNV.

**13.3** The Contractor may disclose Information to the extent required by law, provided that, subject to and without any waiver of the privileges and immunities of the United Nations, the Contractor will give the UNDP sufficient prior notice of a request for the disclosure of Information in order to allow the UNDP to have a reasonable opportunity to take protective measures or such other action as may be appropriate before any such disclosure is made.

**13.4** The UNDP may disclose Information to the extent as required pursuant to the Charter of the UN, resolutions or regulations of the General Assembly, or rules promulgated by the Secretary-General.

**13.5** The Recipient shall not be precluded from disclosing Information that is obtained by the Recipient from a third party without restriction, is disclosed by the Discloser to a third party without any obligation of confidentiality, is previously known by the Recipient, or at any time is developed by the Recipient completely independently of any disclosures hereunder.

**13.6** These obligations and restrictions of confidentiality shall be effective during the term of the Contract, including any extension thereof, and, unless otherwise provided in the Contract, shall remain effective following any termination of the Contract.

#### 14.0 FORCE MAJEURE; OTHER CHANGES IN CONDITIONS

**14.1** In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to the UNDP, of such occurrence or change if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Contract. The Contractor shall also notify the UNDP of any other changes in conditions or the occurrence of any event that interferes or threatens to interfere with its performance of this Contract. On receipt of the notice required under this Article, the UNDP shall take such action as, in its sole discretion; it considers to be appropriate or necessary in the circumstances, including the granting to the Contractor of a reasonable extension of time in which to perform its obligations under this Contract.

**14.2** If the Contractor is rendered permanently unable, wholly, or in part, by reason of force majeure to perform its obligations and meet its responsibilities under this Contract, the UNDP shall have the right to suspend or terminate this Contract on the same terms and conditions as are provided for in Article 15, "Termination", except that the period of notice shall be seven (7) days instead of thirty (30) days.

**14.3** Force majeure as used in this Article means acts of God, war (whether declared or not), invasion, revolution, insurrection, or other acts of a similar nature or force.

**14.4** The Contractor acknowledges and agrees that, with respect to any obligations under the Contract that the Contractor must perform in or for any areas in which the UNDP is engaged in, preparing to engage in, or disengaging from any peacekeeping, humanitarian or similar operations, any delays or failure to perform such obligations arising from or relating to harsh conditions within such areas or to any incidents of civil unrest occurring in such areas shall not, in and of itself, constitute force majeure under the Contract.

#### 15.0 TERMINATION

**15.1** Either party may terminate this Contract for cause, in whole or in part, upon thirty (30) days notice, in writing, to the other party. The initiation of arbitral proceedings in accordance with Article 16.2 ("Arbitration"), below, shall not be deemed a termination of this Contract.

**15.2** UNDP reserves the right to terminate without cause this Contract at any time upon 15 days prior written notice to the Contractor, in which case UNDP shall reimburse the Contractor for all reasonable costs incurred by the Contractor prior to receipt of the notice of termination.

**15.3** In the event of any termination by UNDP under this Article, no payment shall be due from UNDP to the Contractor except for work and services satisfactorily performed in conformity with the express terms of this Contract.

**15.4** Should the Contractor be adjudged bankrupt, or be liquidated or become insolvent, or should the Contractor make an assignment for the benefit of its creditors, or should a Receiver be appointed on account of the insolvency of the Contractor, the UNDP may, without prejudice to any other right or remedy it may have under the terms of these conditions, terminate this Contract forthwith. The Contractor shall immediately inform the UNDP of the occurrence of any of the above events.

#### 16.0 SETTLEMENT OF DISPUTES

**16.1 Amicable Settlement**: The Parties shall use their best efforts to settle amicably any dispute, controversy or claim arising out of this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then obtaining, or according to such other procedure as may be agreed between the parties.

16.2 Arbitration: Any dispute, controversy, or claim between the Parties arising out of the Contract or the breach, termination, or invalidity thereof, unless settled amicably under Article 16.1, above, within sixty (60) days after receipt by one Party of the other Party's written request for such amicable settlement, shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining. The decisions of the arbitral tribunal shall be based on general principles of international commercial law. For all evidentiary questions, the arbitral tribunal shall be guided by the Supplementary Rules Governing the Presentation and Reception of Evidence in International Commercial Arbitration of the International Bar Association, 28 May 1983 edition. The arbitral tribunal shall be empowered to order the return or destruction of goods or any property, whether tangible or intangible, or of any confidential information provided under the Contract, order the termination of the Contract, or order that any other protective measures be taken with respect to the goods, services or any other property, whether tangible or intangible, or of any confidential information provided under the Contract, as appropriate, all in accordance with the authority of the arbitral tribunal pursuant to Article 26 ("Interim Measures of Protection") and Article 32 ("Form and Effect of the Award") of the UNCITRAL Arbitration Rules. The arbitral tribunal shall have no authority to award punitive damages. In addition, unless otherwise expressly provided in the Contract, the arbitral tribunal shall have no authority to award interest in excess of the London Inter-Bank Offered Rate ("LIBOR") then prevailing, and any such interest shall be simple interest only. The Parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such

dispute, controversy, or claim.

#### 17.0 PRIVILEGES AND IMMUNITIES:

Nothing in or relating to this Contract shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations, including its subsidiary organs.

#### 18.0 TAX EXEMPTION

**18.1** Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter-alia that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for public utility services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. In the event any governmental authority refuses to recognize the United Nations exemption from such taxes, duties or charges, the Contractor shall immediately consult with the UNDP to determine a mutually acceptable procedure.

**18.2** Accordingly, the Contractor authorizes UNDP to deduct from the Contractor's invoice any amount representing such taxes, duties or charges, unless the Contractor has consulted with the UNDP before the payment thereof and the UNDP has, in each instance, specifically authorized the Contractor to pay such taxes, duties or charges under protest. In that event, the Contractor shall provide the UNDP with written evidence that payment of such taxes, duties or charges has been made and appropriately authorized.

#### 19.0 CHILD LABOUR

**19.1** The Contractor represents and warrants that neither it, nor any of its suppliers is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which, inter alia, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical mental, spiritual, moral or social development.

**19.2** Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, at no cost to UNDP.

#### 20.0 MINES:

**20.1** The Contractor represents and warrants that neither it nor any of its suppliers is actively and directly engaged in patent activities, development, assembly, production, trade or manufacture of mines or in such activities in respect of components primarily utilized in the manufacture of Mines. The term "Mines" means those devices defined in Article 2, Paragraphs 1, 4 and 5 of Protocol II annexed to the Convention on Prohibitions and Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects of 1980.

**20.2** Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind of UNDP.

#### 21.0 OBSERVANCE OF THE LAW:

The Contractor shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the terms of this Contract.

#### 22.0 SEXUAL EXPLOITATION:

**22.1** The Contractor shall take all appropriate measures to prevent sexual exploitation or abuse of anyone by it or by any of its employees or any other persons who may be engaged by the Contractor to perform any services under the Contract. For these purposes, sexual activity with any person less than eighteen years of age, regardless of any laws relating to consent, shall constitute the sexual exploitation and abuse of such person. In addition, the Contractor shall refrain from, and shall take all appropriate measures to prohibit its employees or other persons engaged by it from, exchanging any money, goods, services, offers of employment or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any person. The Contractor acknowledges and agrees that the provisions hereof constitute an essential term of the Contract and that any breach of this representation and warranty shall entitle UNDP to terminate the Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind.

**22.2** The UNDP shall not apply the foregoing standard relating to age in any case in which the Contractor's personnel or any other person who may be engaged by the Contractor to perform any services under the Contract is married to the person less than the age of eighteen years with whom sexual activity has occurred and in which such marriage is recognized as valid under the laws of the country of citizenship of such Contractor's personnel or such other person who may be engaged by the Contractor to perform any services under the Contract.

#### 23.0 SECURITY:

- **23.1** The Contractor shall:
  - (a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the services are being provided;
  - (b) Assume all risks and liabilities related to the Contractor's security, and the full implementation of the security plan.

**23.2** UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this contract. Notwithstanding the foregoing, the Contractor shall remain solely responsible for the security of its personnel and for UNDP's property in its custody as set forth in paragraph 4.1 above.

#### 24.0 AUDITS AND INVESTIGATIONS:

**24.1** Each invoice paid by UNDP shall be subject to a post-payment audit by auditors, whether internal or external, of UNDP or the authorized agents of the UNDP at any time during the term of the Contract and for a period of three (3) years following the expiration or prior termination of the Contract. The UNDP shall be entitled to a refund from the Contractor for any amounts shown by such audits to have been paid by the UNDP other than in accordance with the terms and conditions of the Contract. Should the audit determine that any funds paid by UNDP have not been used as per contract clauses, the company shall reimburse such funds forthwith. Where the company fails to reimburse such funds, UNDP reserves the right to seek recovery and/or to take any other action as it deems necessary.

**24.2** The Contractor acknowledges and agrees that, at anytime, UNDP may conduct investigations relating to any aspect of the Contract, the obligations performed under the Contract, and the operations of the Contractor generally. The right of UNDP to conduct an investigation and the Contractor's obligation to comply with such an investigation shall not lapse upon expiration or prior termination of the Contract. The Contractor shall provide its full and timely cooperation with any such inspections, post-payment audits or investigations. Such cooperation shall include, but shall not be limited to, the Contractor's obligation to make available its personnel and any documentation for such purposes and to grant to UNDP access to the Contractor's premises. The Contractor shall require its agents, including, but not limited to, the Contractor's attorneys, accountants or other advisers, to reasonably cooperate with any inspections, post-payment audits or investigations carried out by UNDP hereunder.

#### 25.0 ANTI-TERRORISM:

25.1 The Contractor agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received under this Contract are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <a href="http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm">http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm</a>. This provision must be included in all subcontracts or sub-agreements entered into under this Contract.

#### 26.0 AUTHORITY TO MODIFY:

Pursuant to the Financial Regulations and Rules of UNDP, only the UNDP Authorized Official possesses the authority to agree on behalf of UNDP to any modification of or change in this Agreement, to a waiver of any of its provisions or to any additional contractual relationship of any kind with the Contractor. Accordingly, no modification or change in this Contract shall be valid and enforceable against UNDP unless provided by an amendment to this Agreement signed by the Contractor and jointly by the UNDP Authorized Official.